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JOURNAL OF PHARMACY

A RECORD OF THE PROGRESS OF PHARMACY AND THE ALLIED SCIENCES

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THE AMERICAN
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Vol. 93. March, 1921 No. 3

EDITORIAL

AN INSPIRATION.

Not the least important of the attributes of the human intellect implanted by the Creator is inspiration. This is a dual faculty possessing the power alike of receiving and of imparting elevating influences. Some particular occurrence in the career of an individual may make a deep and lasting impression and in some manner, often unexplainable, prove to be the inspiration to a higher ambition and to accomplishments that were considered as beyond his ability. The success that he achieves is not limited to himself, but becomes an inspiration to others, an example that may stimulate many to a nobler and progressive life-work.

What is true of the individual applies with still greater force to events that influence the developments in any of the lines of human endeavor, whether these be in the political, professional, industrial or social arenas. A single event may have an influence upon the future development of an entire calling, or even of the nations of the world, that cannot be foreseen.

The celebration of the Founders' Day by the Philadelphia College of Pharmacy and Science is an occurrence of more than passing interest. The lessons and the inspiration radiating from the ceremonies associated with this centennial, like unto the event that it commemorated, must have a permanent influence toward the advancement of the profession of pharmacy.

Upon such an occasion it is natural for the participants to reflect and bring in mental review the occurrences of one hundred years ago and to conceive some idea of the motives and thoughts that actuated the prime movers in the events that led to the creation of the Philadelphia College of Apothecaries, the first pharmaceutical

society organized in the new world. The gradual evolution of the practice of pharmacy in America, its condition at that time and at least some of the errors and frauds that had crept into the drug business at that period along with the particular action of the trustees of the University of Pennsylvania that inspired the worthy druggists and apothecaries of the City and Liberties of Philadelphia to organize themselves into a college, are matters that have been fully recorded. From a perusal of these records it does not appear that the men who were active in the movement had given very much thought to the possibilities and influences that might flow from their action or had a vision of what the result of their efforts would mean to the future of pharmacy. The existing conditions inspired them to take action in accordance with their deliberate judgment and to establish an institution whose example and labors have been of incalculable value in the development of the profession in which they were engaged and, likewise, in the benefits accruing to the public. Their efforts have been a continuous inspiration extending throughout the century that has past and their achievements remain with us and the coming generations not alone as historical records of accomplishments but, likewise, as potent influences. The inspirations of the century that is closing are an enduring foundation for renewed energies and still higher aspirations.

The inspiration growing out of this centennial celebration of the founding of pharmaceutical education in America should be of sufficient magnitude and of such potent influence that the pessimistic views that have found expression as a passing fad among *quasi* pharmacists should be forever drowned out. The first century of pharmaceutic education has left a firm and well built foundation, and the achievements of the past and the plans for the future are inspirations for an unprecedented progress and our imagination pictures a magnificent addition to the temple of pharmacy erected long before the close of the second century.

G. M. B.

ORIGINAL PAPERS

FOUNDERS' DAY CELEBRATION.

The One Hundredth Anniversary of the founding of the Philadelphia College of Pharmacy and Science was celebrated on February 23d, by appropriate exercises. The lecture rooms, the various laboratories, the museum and the library were open to public inspection and numerous visitors viewed the extensive exhibits, and were surprised to note the extent of the collections and equipment.

In the afternoon a number of the descendants of the founders of the College, the present officers, faculty members and many of its friends gathered in the library. Shortly after two o'clock they proceeded by automobile to Carpenters' Hall, where a special meeting of the College was held. The commemorating services here were opened by President Howard B. French calling the meeting to order, and reading from a copy printed in 1821, the preamble and constitution adopted by the Philadelphia College of Apothecaries.

Then the Secretary of the College, Dr. Charles A. Weideman, read from the original minutes the transactions of the meeting held in this historic building by the druggists and apothecaries of the City and Liberties of Philadelphia on February 23, 1821, and the subsequent meetings held on March 13, 1821, and two weeks later, at which the first officers and trustees of the College were elected.

This was followed by a brief address by George M. Beringer, Chairman of the Board of Trustees, in which the work of the founders of the College was referred to; the history of the organization; its endeavors and progress for the past century; and its aims and hopes for future developments were outlined.

Charles Marshall, a direct descendant of Charles Marshall, the first president of the College, was present at these exercises. Likewise Henry Troth, a grandson of Henry Troth, one of the founders, and Wm. S. Ellis, a grandson of Charles Ellis, one of the original members.

Those in attendance at Carpenters' Hall signed a roll book as a permanent record of the attendance. At the close of the meeting,

a moving screen picture was taken of Carpenters' Hall and the audience leaving, and this will likewise be preserved as a historical record of the event.

In the evening, the main commemorative services were held in the College auditorium. This room and the gallery were filled with members, friends, students and alumni, gathered to pay tribute to the founders and the achievements of the past century.

President French welcomed the guests, many of whom had come from New York, Washington, Baltimore and other distant places, and stated the purpose of the gathering.

Dean Charles H. LaWall then read a paper on the founding of the Philadelphia College of Pharmacy and Science, in which the events which led up to the initial meeting and the formation of the College were related.

The next speaker of the evening was Prof. Henry Vin Arny of the College of Pharmacy of Columbia University, New York City. The title of his address was "Pharmacy 100 Years Ago."

As Prof. Arny ceased speaking, Mayor Moore arrived, and when he was introduced by the chairman, received a hearty ovation. In the course of his remarks the Mayor referred to the efficient work in behalf of humanity that this College has performed. He said "That this school has lived for 100 years proves its endurance and its quality." He promised his personal assistance and influence in seeing that the Philadelphia College of Pharmacy and Science is moved from its present location to a more desirable one. He declared that "It is wonderful to think of the world-wide influence of this institution from whose walls have gone forth not only men, but thoughts, the contributions of genius. The College should not have remained in its present environment so long. It should have been moved years ago. I can only hope that in some way the Mayor, long before his retirement from office, may be able to assist in having this institution housed in a building more suitable for a school of its dignity and service. This is due the College for the work it has performed and for the sake of its splendid student body."

The remarks of the Mayor were construed as showing his purpose to co-operate with the officers of the College in endeavoring to secure a site for the new buildings on or near the Parkway.

The closing address of the evening was made by Prof. Samuel P. Sadtler, Emeritus Professor of Chemistry of the Philadelphia

College of Pharmacy and Science. His topic was "The Influence of Pharmacists on the Development and Advance of Modern Chemistry." These addresses are published in full in this number of the JOURNAL.

A pleasant feature of this celebration was the numerous congratulatory letters and telegrams that were received from all parts of the country. President French read some of these to the audience. Space permits the reproduction of but a few:

"University of Pennsylvania,
February 23, 1921.

Howard B. French, Esq.,
The Philadelphia College of Pharmacy and Science,
Philadelphia, Pa.

My dear Mr. French:

I find on my desk a little pamphlet, containing the programme of the exercises commemorative of the Centennial of the Philadelphia College of Pharmacy and Science. I regret exceedingly that it will not be possible for me to attend any of the various exercises. Will you please accept from me, both officially and personally, my hearty felicitations on the rounding out of a hundred years of the splendid work that has been done by the institution over which you preside?

Sincerely yours,
(Signed) JOSIAH H. PENNIMAN."

"St. Louis College of Pharmacy,
St. Louis, Mo., February 14, 1921.

Mr. Howard B. French, President,
The Philadelphia College of Pharmacy and Science,
Philadelphia, Pa.

Dear President French:

First of all, permit me to sincerely thank you for remembering me with an invitation to the Centennial Celebration of Founders' Day of the Philadelphia College of Pharmacy and Science.

I regret that I do not see my way clear to be present in person, but you may rest assured that I shall be there in spirit.

I have the honor of holding the degree of Ph. M. from the

College and have, for many years, been acquainted with the institution and appreciated the good work your school is doing.

I trust that your observation of the Centennial, February 23, 1921, will be pleasant and successful in every particular.

Yours very truly,

(Signed) H. M. WHELPLEY, *Dean.*"

"St. Louis, Mo., Feb. 23, 1921.

Howard B. French, President,
Philadelphia College of Pharmacy and Science,
Philadelphia, Pa.

Congratulations and best wishes from the St. Louis College of Pharmacy on your Centennial Celebration.

GEORGE R. MERRELL, *President.*"

"Atlanta, Ga., Feb. 23, 1921.

Philadelphia College of Pharmacy and Science,
Philadelphia, Pa.

We who have retained our love and friendship for the Philadelphia College of Pharmacy and Science, and will always hold a pride for her traditions and feel ever rejoiced at her progress and welfare, beg to join our names to those who are celebrating the Hundredth Anniversary of our Alma Mater.

JOSEPH JACOBS (1879).
SINCLAIR SARTORIOUS JACOBS (1909)."

"New Orleans, La., Feb. 23, 1921.

Prof. S. P. Sadtler,
145 North 10th Street,
Philadelphia, Pa.

Congratulations to my Alma Mater on its Hundredth Anniversary. May P. C. P. & S. live forever is the wish from sunny south.

ADAM WIRTH."

"Ann Arbor, Mich., Feb. 21, 1921.

Dean Charles H. LaWall,
Philadelphia College of Pharmacy and Science,
Philadelphia, Pa.

The College of Pharmacy of the University of Michigan congratulates the Philadelphia College of Pharmacy and Science most cordially upon the One Hundredth Anniversary of Founders' Day to be celebrated on Wednesday of this week. The contributions of your College to American Pharmacy during the past century have indeed been remarkable. May your future be as brilliant as your past has been illustrious. We regret exceedingly that we cannot be represented by some member of our faculty.

EDWARD H. KRAUS, *Acting Dean.*"

"Havana, Cuba,
February 22, 1921.

Mr. Howard B. French,
Philadelphia College of Pharmacy and Science,
Philadelphia, Pa.

Our heartiest congratulations to the mother of American Pharmacy on her Centennial Celebration. May the good work of its founders and those who followed them for the past hundred years be the guiding light to the younger generations and help them maintain her standard *The First College of Pharmacy in the World.*

PROF. JOSE P. ALACAN.
MISS SILVIA C. ALACAN (1915)."

"Madison Wis., February 21, 1921.

Philadelphia College of Pharmacy and Science,
Philadelphia, Pa.

Please accept hearty congratulations of University of Wisconsin and its Department of Pharmacy upon being the first institution to have completed a century of activities of usefulness and advance in pharmaceutical education along the various lines of the profession. May the knowledge of the past achievements stimulate your present and future associates to continued effort during the century just starting.

E. A. BIRGE."

"The Pennsylvania State College,

State College, Pa., February 18, 1921.

Mr. Howard B. French, Pres.,
Philadelphia College of Pharmacy and Science,
Philadelphia, Pa.

My dear Mr. French:

Permit me to thank you for your kind invitation to be present at the Centennial Celebration of Founders' Day of the Philadelphia College of Pharmacy and Science on the 23rd instant. My conditions prevent my personal acceptance of the invitation, but I trust that you may have a very enjoyable occasion and that it may serve to bring to the mind of the public the very important contributions which the College has made to American pharmacy.

Very cordially,

(Signed) WILL FREAR."

"Massachusetts College of Pharmacy,

Boston, Mass., February 21, 1921.

Philadelphia College of Pharmacy and Science,
Philadelphia, Pa.

Gentlemen:

Your kind invitation for me to attend the Centennial Celebration of Founders' Day on Wednesday, February 23, is received, and it is only because of an important prior engagement on the same date that I am compelled to send my regrets. I hope to be able to attend the main centennial celebration in June, if honored with an invitation to them.

We all rejoice at the long and honorable record of achievement made by your institution and hope for even greater things from you in the future.

With my best wishes for the success of the Celebration, I am,

Yours very truly,

(Signed) THEODORE J. BRADLEY, *Dean.*"

"Western Reserve University,
Cleveland, Ohio, February 15, 1921.

Dr. Charles H. LaWall,
145 North 10th Street,
Philadelphia, Pa.

Dear Dr. LaWall:

I am in receipt of the invitation of the Philadelphia College of Pharmacy and Science to attend the Centennial Celebration of Founders' Day.

I only wish that I could attend and meet many of the men and women who will bring back memories of early pharmacy to Philadelphia. I know that I could learn much and derive a great deal of enthusiasm from my work by being present at such a gathering. I know that it will have the same effect of giving enthusiasm to the members of your faculty and go far towards bringing future success to your College. I am ever,

Sincerely yours,
(Signed) EDWARD SPEASE."

"1525 Walnut Street,
Philadelphia, Pa.,
February 14, 1921.

Mr. Howard B. French, President,
Philadelphia College of Pharmacy and Science,
Philadelphia, Pa.

My dear Mr. French:

Thank you very much for your kind invitation to attend the Centennial Celebration of Founders' Day.

The Philadelphia College of Pharmacy and Science has an honorable and enviable record. Its great teachers and its wise and progressive board of trustees have, I verily believe, done more for the advancement of pharmacy as a profession than any other single agency of which I have knowledge.

The United States Pharmacopœia and all that it stands for in the way of scientific progress is in large measure the product of the scientific zeal, the indefatigable industry and the broad outlook of men identified with the Philadelphia College of Pharmacy and Science and their influence upon pupils and confreres associated in the work.

Permit me to congratulate you and your colleagues of the trustees, as well as the faculty and alumni association, and to wish for the future a glory that shall surpass that of former days.

I trust to be present at the Celebration, but send this letter, so that should I be unavoidably prevented, you will know that it is not from want of appreciation either of the College, or of your courtesy.

Sincerely yours,

(Signed) S. SOLIS COHEN."

"St. Louis, Mo.,

February 23, 1921.

Prof. Charles H. LaWall,

Philadelphia College of Pharmacy and Science,

Philadelphia, Pa.

The Meyer Druggist and many other friends of your school here join in felicitations on the Centennial of Founders' Day of your historic institution.

HENRY M. WHELPLEY, *Editor.*"

"Medical College of Virginia,

Richmond, Va., February 15, 1921.

Dr. Charles H. LaWall,

Philadelphia College of Pharmacy and Science,

Philadelphia, Pa.

Dear Dr. LaWall:

I thank you for the invitation to attend the Centennial Celebration of the Philadelphia College of Pharmacy. I sincerely trust that the occasion will be profitable and pleasant, as I know it will be. It would certainly give me much pleasure to have a share in so important an event in the history of an institution which has had so great a part in pharmaceutical education in America.

With best wishes and kind personal regards for yourself and your co-workers, I am,

Sincerely yours,

(Signed) WORTLEY F. RUDD,

Dean, School of Pharmacy."

"Parke, Davis & Company,

Detroit, Mich., Feb. 16, 1921.

Mr. Howard B. French, President,
Philadelphia College of Pharmacy and Science,
Philadelphia, Pa.

Dear Mr. French:

In this afternoon's mail I have received an invitation to the Centennial Celebration to be held at the Philadelphia College on February 23. I am honored to be among the invited, and I sincerely regret that circumstances will prevent me from being present. Mr. Bartlett is out of town and I cannot very well get away until his return.

You will receive hundreds of compliments on the arrival and conduct of such a celebration. One more or less doesn't particularly matter, and yet I want to add my meed of praise to the Philadelphia College. No other institution can boast of such a long history, and none has such a bright galaxy of stars in the firmament represented by its alumni. Our late president, Mr. Ryan, would be intensely interested in the event if he were still with us, and once more we are reminded of the great loss which we have all suffered in his death.

I wish it were possible to be present on the 23rd. I shall be with you in spirit, and I sincerely trust that the affair will go off with all the sentiment and brilliance which are characteristic of the Philadelphia College of Pharmacy and Science.

Very sincerely yours,

(Signed) HARRY B. MASON,
Secretary."

"Purdue University,

Lafayette, Indiana, February 15, 1921.

Mr. Howard B. French, President,
Philadelphia College of Pharmacy and Science,
Philadelphia, Pa.

Dear Mr. French:

Permit me to sincerely thank you for the kind invitation to be present at the Centennial Celebration of Founders' Day. I am sorry to say that it will not be possible for me to attend

this celebration. Permit me, however, to extend to you and the College my sincerest wish for another hundred years of such excellent service as your College has rendered to our profession.

Very truly yours,

(Signed) C. B. JORDAN,
Director, School of Pharmacy."

"Johns Hopkins University,
Baltimore, Md., February 14, 1921.

Mr. Howard B. French,
Philadelphia College of Pharmacy and Science,
Philadelphia, Pa.

Dear Mr. French:

I regret very much that circumstances prevent my attendance at the Centennial Celebration of Founders' Day of the Philadelphia College of Pharmacy and Science. I have always prized very highly my honorary membership in the College. Certainly, no other institution of our country has had so great an influence on the development of pharmacy, as well as the allied sciences, as has the Philadelphia College of Pharmacy and Science. Please accept my best thanks for remembering me with an invitation on this great occasion.

Very sincerely yours,

(Signed) JOHN J. ABEL."

"Cincinnati, Ohio,
February 23, 1921.

Philadelphia College of Pharmacy and Science,
Philadelphia, Pa.

The Cincinnati College of Pharmacy through its officers and faculty extends hearty greetings on its one hundredth anniversary of service and as the founder of true American pharmacy and we trust that truth, honor and science in pharmacy of the past may find equal prominence at the next centennary of Philadelphia College of Pharmacy and Science.

F. S. KOTTE, *President.* WALTER R. GRIESS, *Dean.*
JOHN URI LLOYD. CHARLES T. P. FENNEL."

THE FOUNDING OF THE PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE.*

By CHARLES H. LAWALL, Ph.G. (1893), Ph.M. (1906),
Dean and Professor of Pharmacy,
Philadelphia College of Pharmacy and Science.

We of the present are met together upon this Centennial occasion to do homage to those of the past. The debt to the Founders of the Philadelphia College of Pharmacy and Science is not ours alone. It is society's debt which we, as co-sharers in the benefits which have resulted from that act, are privileged to repay in part by ceasing from our present labors for a time in order that we may bring proper tribute to the memory of those men and do justice to their accomplishments.

America one hundred years ago was a sparsely settled country, with few and difficult means of intercommunication between distant points, neither railways nor canals having yet appeared.

Philadelphia one hundred years ago was the largest and most important city in these United States, which had yet to celebrate their semi-centennial as a nation.

To properly appreciate the atmosphere in which these men lived and the difficulties under which they labored we must refresh our minds regarding some of the material changes that have taken place since that time.

A glimpse at a Philadelphia city directory for 1821 will give us an impression of the period through certain occupations which are listed with frequency, and which are missing in a directory of today. *Bleeder and Barber* is one of the noteworthy instances of a peculiar occupation which continued even beyond that period, reminding us that the surgeon was not necessarily a medical doctor, nor even a person of education. This is perpetuated in the red and white striped barber pole of today, then the advertising sign of the bloodletter.

Sea Captain, Mariner, Shipwright, Sailmaker are redolent of the days of wooden sailing ships, then supreme upon Poseidon's realm and just beginning to be displaced by steamboats upon the inland waters of our eastern coast.

*An address delivered at the Centennial Celebration of Founders' Day, February 23, 1921.

Chimney Sweep, Sweep Master, Tallow Chandler are reminiscent of the open hearth wooden fires and the meagre illuminating facilities of a period antedating the use of coal or kerosene for heating or lighting.

Carter, Cordwainer, Fishmonger, Ostler, Scrivener, Soapboiler, Tavern Keeper, Victualler, White Smith and Woodsawyer each carry evidence of the close association of the language of that time with the mother tongue of England.

Pepperpotmaker is an occupation confirming the early origin of Philadelphia's gastronomic distinctiveness which is still acknowledged in some directions.

Friction matches had yet to be invented. Daguerre had not yet practiced his art of reproducing likenesses, hence the only pictures we have of the founders who died before 1840 are from oil paintings or miniatures. Gold had yet to be discovered in California, and oil in Pennsylvania. Elias Howe had not yet invented the sewing machine.

Letter postage ranged from six cents to twenty-five cents for a letter of a single sheet of paper, depending upon the distance it was carried.

The first train of railway cars had yet to run, while the telegraph, telephone and typewriter were in the dim and misty future. Percolation had not been suggested for drug extraction. Alkaloids were of such recent discovery that they were still called vegetable alkalies.

The work of Liebig, Berzelius, Wöhler and Pasteur was still to be done.

Heat was discussed as a material substance in the works in physics and was usually called caloric.

Professional and scientific interest and education was just awakening along certain lines.

The University of Pennsylvania had established its Medical School a bare half-century before and was then conducting a three-year course, attended by several hundred students, and numbered among its professors such distinguished men as Dr. John Redman Coxe, Dr. Robert Hare, Dr. Philip S. Physick, and Dr. W. C. P. Barton. The course in Natural Sciences at this same Institution had not yet emerged from the difficulties which attended the teaching of science at a time when science and irreligion were looked upon as synonymous by many. In that department the professors

received no salaries and were required to furnish their own apparatus and specimens and were not considered members of the faculty.

There was no distinct department of Chemistry at the University, the instruction in that branch being given in connection with medicine. A memorial which had shortly before been presented to the Trustees of the University of Pennsylvania, signed by Drs. Rush, Wistar, Barton and Physick, is worth quoting in full to illustrate the field which chemistry was then supposed to cover:

"It is peculiarly expedient that the Professor of Chemistry should have a full and extensive knowledge of medicine, because very many valuable articles of the materia medica are derived from chemistry and the nature of these articles can only be understood by a person who has a competent knowledge of both chemistry and medicine. The students of medicine who almost exclusively support the Professorship of Chemistry are induced to do so in consequence of its application to Pharmacy and the different branches of medicine. No man can teach Pharmacy unless he has some knowledge of the practice of medicine and the application of chemistry to physiology and the other branches of medical science can only be taught by a chemist who understands them."

The chair of Materia Medica in the University was changed in 1818 to the chair of Materia Medica and Pharmacy, which was continued unchanged in title for many years. A similar change had occurred some years before, but had been abandoned. All final examinations for a doctorate degree were conducted orally and often before the Trustees of the Institution. Each applicant was required also to publicly defend his thesis, which was an original dissertation required as part of his collegiate work.

Text books and reference books on Chemistry were fairly numerous even then, but none had appeared in which the use of chemical symbols simplified the teaching of reactions. Some of the most popular treatises of the day on Chemistry were in the style of "conversations," a stilted and prolix form which has no counterpart today. "Chemical Amusement" was the title of another book of the period. This was written by Frederick Accum, who is noted as the author of "A Treatise on Adulterations of Food, and Culinary Poisons" published in Philadelphia in 1820, one of the earliest treatises of its kind.

James Cutbush, concerning whose work and character Dr. Edgar Fahs Smith has contributed a most interesting monograph, was an early Philadelphia Chemist and Apothecary who published

many articles of interest and value upon chemical subjects beginning with 1808.

He was in business at 25 South Fourth Street in 1819, and as early as 1812 had advertised a course of "Evening lectures on Chemistry" and also "Lectures on Theoretical and Practical Pharmacy." For this latter course a fee of twenty (20) dollars was charged. This course was evidently neither popular nor successful, for no further reference is found relating to it, although Mr. Cutbush attained the distinction of being appointed Assistant Apothecary General in the U. S. Army on August 12, 1814. The duties of this office must have kept him busy in this vicinity for in the Philadelphia Directory of 1821 he is listed as "Assistant Apothecary General of the U. S. Army, residing at 207 South Fourth Street."

Conditions in Pharmacy at that period had not been satisfactory to many of the medical practitioners of the period, nor to the leading apothecaries, as they were then officially termed. The practice of writing prescriptions had been established in Philadelphia about 1765 by Dr. John Morgan, who, upon returning from the completion of his medical studies in Europe, had been accompanied by an accomplished apothecary from Great Britain, named Leighton, who brought with him a large assortment of medicines. This first prescription store in Philadelphia did not long survive the antagonism of local physicians and pharmacists, and it is stated that even at the close of the American Revolution there were only three medical practitioners in Philadelphia who confined their practice to prescription writing.

An unsuccessful attempt was made in 1789 to interest American medical men in the establishment of a national Pharmocopœia in which Dr. Samuel Powell Griffitts, of the University of Pennsylvania, took a prominent part.

Through ignorance and carelessness certain abuses crept into the early drug business primarily because there was neither control from without nor inspiration from within. Patent medicines became numerous, most of them being founded upon the prescriptions of successful physicians, for it must be remembered that a prescription was at that time believed to be a combination of medicaments satisfactory for the relief of disease without the necessity of modification or alteration to suit the particular individual as is the scientific and approved practice today.

Indeed, at that time, the most eminent of medical practitioners allowed their names to be attached to "Formularies" which purported to contain the successful recipes and prescriptions from the most celebrated physicians of this country and Europe. Many of our official compound preparations of today, still widely used, are prescriptions of illustrous practitioners of the past. Among these are Dover's Powder, originated by Dr. Thomas Dover of England, about 1725; Huxham's Tincture, by Dr. John Huxham of England, in 1755; Fowler's Solution, by Dr. Thomas Fowler of England, in 1786; Blaud's Pills, by Dr. J. Blaud of France, in 1831; Coxe's Hive Syrup, by Dr. John Redman Coxe, about 1810; and Jackson's Pectoral Syrup, by Dr. Samuel Jackson, about 1835; and many others might be given. One of the serious conditions which occurred at that time was the prevalence of adulteration of drugs and medicines, and of substitutions. Indeed, one earlier authority published an entire work upon the latter subject called *"Quid Pro Quo."* Another in an American work published in 1818, justified substitution in certain cases as follows:

> "First, for persons who haggle over price and care not for quality, and
>
> Second, for those who are bad pay, to compensate for the risk of loss," and accompanied this advice with an approved list of substitutes for certain drugs.

The culmination of the feeling regarding this condition was reached early in 1821, when the University of Pennsylvania took steps leading toward the establishment of a course in Pharmacy, at the request of the medical faculty.

Resolutions were passed by the Board of Trustees of the U. of P. on February 21, 1821, in which announcement was made of the intention to establish a course of instruction in pharmacy and to confer the honorary degree of Ph. M. upon certain prominent apothecaries of the city at that time.

Prior to this, however, the Trustees of the University had received an application in 1816 from Dr. James Mease, a Philadelphia physician, to conduct a course of lectures in Pharmacy. This permission had been granted, but it is probable that no applicants appeared to take the course, for no further mention was ever made of it.

The Philadelphia Apothecaries learning of the action of the University Trustees, on February 21st had their self-respect challenged by the move to conduct a course in Pharmacy without first

consulting the apothecaries themselves, and as tradition has it, the two individuals directly responsible for the protest which was voiced at the meeting held in Carpenters' Hall, on the day whose centennial we are celebrating, were Peter Lehman and Henry Troth, the former a retailer, the latter a wholesale druggist of prominence at that time.

On February 23, only two days after the publication of the resolutions adopted by the University of Pennsylvania Board of Trustees, the initial meeting of the Founders of this College was held. We do not know the complete list of those in attendance, but we know that Stephen North was made Chairman, and Peter Williamson, Secretary, and resolutions were prepared and offered, and after some debate were adopted and referred to a committee, who were given power to call a subsequent meeting "at such time and place as they deem proper."

This special committee was noteworthy for the character and standing of its members. The names are as follows:

Samuel Jackson, M.D.	40 N. Fourth Street
Daniel B. Smith	33 High (Market) Street
Robert Milnor	161 S. Second Street
Peter Williamson	Second and Almond Street (below Bainbridge Street)
Stephen North	14 N. Second Street
Henry Troth	222 High (Market) Street
Samuel Biddle	142 High (Market) Street
Charles Allen	160 S. Second Street
Frederick Brown	with Chas. Marshall, 56 Chestnut Street

These street numbers are under the former system and bear no direct relation to present locations.

Samuel Jackson was then 34 years of age, and had been associated with his father and brother in the drug business. He became the first Professor of Materia Medica and Pharmacy, resigning in 1827 to take a similar chair later at the University of Pennsylvania, where he continued until his death in 1872. He was one of the most illustrious of practitioners and teachers of medicine of his time. He was President of the first Philadelphia Board of Health, which had as its secretary the renowned

Franklin Bache, later Professor of Chemistry in our College. It was Dr. Jackson who first suggested the present name of the Philadelphia Academy of Natural Sciences, and that organization celebrates its Founders' Day on the anniversary of the date upon which this name was adopted, the previous meetings having been informal gatherings. It is a curious commentary on the period that Dr. Jackson was not at the time a member of the group of men who formed the Academy, because being a rising young medical practitioner he could not afford the inference of irreligion which attached to those who were too deeply interested in natural science.

DANIEL B. SMITH was a young man of 29 at the time of this meeting. He had learned the drug business with John Biddle of Philadelphia, and had entered business for himself at Sixth and Arch. Later the firm name was Smith & Hodgson, who were subsequently succeeded by Bullock and Crenshaw. In 1820, he aided in the establishment of the Apprentices' Library. He was the Chairman of the first publication committee of the *American Journal of Pharmacy* and a frequent contributor of valuable papers. He was one of the original members of the Franklin Institute, and one of the incorporators and the first corresponding secretary of the Pennsylvania Historical Society. He was one of the incorporators and an early manager of the Philadelphia Savings Fund Society. He helped to establish the House of Refuge. In 1834, he became Professor of Moral Philosophy, English Literature, and Chemistry at Haverford College. He returned to Philadelphia twelve years later and re-entered business. He became the first President of the American Pharmaceutical Association in 1852. In 1853, he retired from business and lived in Germantown until his decease in 1883.

ROBERT MILNOR was a druggist at 161 South Second Street. He was long connected with the College and continued as a member until 1841 without ever taking an active part, so far as the records show.

PETER WILLIAMSON was a youth of 24 in 1821. He was the presiding officer at the semi-centennial in 1851. He was

connected with the establishment of many charitable and philanthropic organizations and was later grand master of Free and Accepted Masons in Pennsylvania. He established the first free scholarship for tuition in the Philadelphia College of Pharmacy, was the Founder of the Southwark Dispensary and a Warden in the Episcopal Church in Southwark.

STEPHEN NORTH was a wholesale druggist at 14 North Second Street, of whom we know but little, as he was evidently but a young man and died in 1826, but a few years later. He was second Vice-President of the College from 1821 to 1824, and first Vice-President from 1824 until his decease.

HENRY TROTH was a young man of 27 when the Carpenters' Hall meeting was held. He learned the drug business with Jeremiah Morris in the store on Market Street, near Seventh. He aided in the establishment of the Philadelphia Literary Association, afterward including a noteworthy group of men prominent in civic and educational affairs. In 1815, when he was but 20 years of age, he formed a partnership with his brother-in-law, Edward Needles, another druggist, under the name of Henry Troth & Co., wholesale druggists. He was one of the originators of the House of Refuge, a manager of the Schuylkill Navigation Company, and was connected prominently with many other philanthropic, business and scientific organizations. He was a member of the Philadelphia Councils for nine years, part of which time he presided over that body. He was a trustee of Girard College, and a Director of the Bank of the United States. He was one of the first to burn anthracite coal in a grate and he was one of those who urged and aided in the introduction of illuminating gas. Besides being one of the founders of the Philadelphia College of Pharmacy, he was its Vice-President for 13 years, and presided over many of its meetings. He was chairman of its Board of Trustees for many years, and died in 1892.

SAMUEL BIDDLE was a druggist of 142 High Street, concerning whom we know little, as he, too, died a few years after, in 1824.

CHARLES ALLEN was a druggist at 160 South Second Street, resigned in 1827 and removed from the city.

FREDERICK BROWN was another young man of 25, who learned the drug business with Charles Marshall, beginning with 1812, and was associated with him for a number of years subsequently. He was in business for himself at Fifth and Chestnut Streets for many years. He, too, was prominently identified with the development and work of many Philadelphia institutions, was manager of the Pennsylvania Hospital for a time, and one of the founders of Laurel Hill Cemetery.

These brief sketches show the type of men who founded this great Institution. It was an enterprise of youth, for the average age of the five whose ages we know, was but 28 years at the time of the founding, the oldest being Samuel Jackson, who was 34, and the youngest, Peter Williamson, who was but 24.

We owe a debt of gratitude, too, for the selection of Carpenters' Hall for their initial meeting. It is in harmony with the high ideals subsequently displayed in handling the affairs of the College.

This Committee called their associates together on March 13th, at which time they recommended the establishment of a College of Apothecaries and the erection of a School of Pharmacy. There were sixty-eight charter members of this proposed college. Their names and addresses at that time are as follows:

Charles Marshall	56 Chestnut Street
Jeremiah Morris	293 High (Market) Street
William Heyl	35 High Street
John Elliott	60 South Front Street
Peter Lehman	320 High Street
Daniel Elliott	60 South Front Street
Wm. Revoudt, M.D.	Wood Street and Old York Road
Mathias Pleis	461 North 2nd Street
Edmund Pryor	373 North Front Street
Thomas Wiltberger	169 North 2nd Street
Jacob Bigonet	158 Lombard Street
Frederick Klett	261 North 2nd Street
Thomas Cave	298 High Street
Caleb Ash, Jr.	66 North 9th Street

Thomas A. Mason	183 South 6th Street
Alexander Fullerton, Jr.	33 Filbert Street.
Edward Needles	222 High Street
Charles Thomson	34 Sassafras (Race) Street
George Glentworth	Chester and Race Streets
Daniel Thatcher	2nd and High Streets
Thomas Evans	3rd and Spruce Streets
Anthony H. Morris	45 North 3rd Street
Jeremiah Emlen	6 North 3rd Street
William Lehman	76 South 2nd Street
Stephen North	14 North 2nd Street
Charles Allen	160 South 2nd Street
Warder Morris	45 North 3rd Street
Edward B. Garrigues	6 North 6th Street
Robert Milnor	162 South 2nd Street
James W. Simes	459 High Street
James S. Ewing	221 Chestnut Street
George D. Wetherill	16 Arch Street
Isaac Thomson	2nd and High Streets
James L. Smith	134 Chestnut Street
Anthony Ecky	83 Union Street
Charles Ellis	56 Chestnut Street
Mordecai L. Gordon	66 North 2nd Street
Algernon S. Roberts	76 South 2nd Street
John P. Wetherill	65 North Front Street
Daniel Laws	5th and Spruce Streets
Edward Lowber	144 North 3rd Street
Charles Yarnall	24 North Front Street
Henry M. Zollickoffer	6th and Pine Streets
Samuel Biddle	142 High Street
Charles Treichel	99 Walnut Street
Daniel B. Smith	33 High Street
Charles Marshall, Jr.	310 High Street
Samuel Jackson, M.D.	40 North 4th Street
Henry Troth	222 High Street
Thomas McClintock	107 South 9th Street
Elisha Crowell	2nd and Shippen Streets
Samuel P. Wetherill	65 North Front Street
William Baker	6 North 5th Street
Joseph Allen	202 South 3rd Street

Peter Williamson	2nd and Almond Streets
William C. Poole	62 North 2nd Street
Richard Jordan	3rd and Coates Streets
Frederick Brown	56 Chestnut Street
Thomas Oliver	Front and Catharine Streets
George H. Burgin, M.D.	55½ North 3rd Street
Solomon Temple	121 High Street
Eleazer L. Cohen	239 Market Street
John J. Smith, Jr.	121 High Street
Charles Wetherill	65 North Front Street
George Babé	Front and Cedar Streets
Charles Rizer	5th and Passyunk Avenue
Wilson Jewell, M.D.	
Peter Thomson, Jr.	

These charter members, by their support and guidance, likewise deserve credit in the founding of the College, for from their ranks came the officers and workers of many subsequent years of activity, and among them were individuals of great prominence in city affairs later.

On March 27th, 1821, scarcely five weeks after the initial meeting on February 23rd, the Philadelphia College of Apothecaries was duly organized with the following officers, concerning each of whom a monograph might be written if space and time afforded.

Charles Marshall, President
William Lehman, First Vice-President
Stephen North, Second Vice-President
William Heyl, Treasurer
Daniel B. Smith, Secretary

MEMBERS OF THE BOARD OF TRUSTEES

Charles Allen	Henry M. Zollickoffer
Samuel Biddle	Samuel P. Wetherill
Daniel Thatcher	Warder Morris
Samuel Jackson	Daniel Elliott
Peter Williamson	Jeremiah Morris
Charles Marshall, Jr.	Henry Troth
Peter Lehman	Thomas Wiltberger
Thomas McClintock	Frederick Brown

The Trustees promptly met and organized by drafting by-laws, appointing committees, etc., and the committee appointed for that purpose reported on plans for instruction.

Early in April, Samuel Jackson, M.D., was elected Professor of Materia Medica and Pharmacy, and Gerard Troost, M.D., was elected Professor of Chemistry.

Samuel Jackson's career has already been described. Of that of Gerard Troost much might be written. He was a native of Holland who had but recently settled in America, who, during the few years he resided in Philadelphia, identified himself with much that was important in its scientific development. He was the first President of the Academy of Natural Sciences, later removed to Nashville, where he associated himself with the State University, and still later, becoming State Geologist, made an illustrous name for himself as paleontologist.

These original professors were the first of an illustrious line, of which not only our Institution but American Pharmacy and American Medicine may be justly proud. During the first half century of the College, the following names are those of professors of pharmacy, materia medica and chemistry: Jackson, Troost, Ellis, Wood, Bache Griffith, Fisher, Bridges, Carson, Thomas, Parrish and Procter.

In addition to inaugurating the course of instruction which was planned to start the following November the members of the College established rules and regulations for the conduct of the business on the part of the members of the College, which later developed into the earliest code of pharmaceutical ethics established in America.

It is interesting to observe from newspaper advertisements published shortly before the course of lectures started how explicitly all of the details are discussed and how frankly the reasons for founding the College are stated.

From Poulson's *American Daily Advertiser,* Monday, October 29, 1821:

"COLLEGE OF APOTHECARIES.

"In the division of the sciences that characterizes the philosophy of the present age, and which has so much tended to their improvement, Pharmacy has been withdrawn from the charge of the Physician, and consigned to the care of the Apothecary. In Europe, this division has long been recognized and sanctioned by the Medical Profession. Colleges of Apothecaries, and other similar institutions, have been established, devoted expressly to instruc-

tion in Pharmacy and its subsidiary sciences. On the continent, most of the respective governments have prohibited, under heavy penalties, any one from selling or preparing Drugs and Medicines for administration, who has not passed through a course of instruction, and become practically acquainted with the business. In Great Britain, most Apothecaries are regularly instructed, by attendance on the lectures of the Colleges of Apothecaries of London and Dublin, and are associated as members, while abuses in the business are guared against by severe penalties, enacted by Parliamentary statute.

"In this country, Pharmacy has been entirely neglected, as a science. Previous instruction has not been considered indispensable, in order to capacitate an Apothecary for pursuing his profession, while very few practitioners of Medicine possessed more than a superficial acquaintance with the principles and details of Pharmaceutic knowledge. From this state of things, many evils, some of a serious and aggravated nature, have flowed, urgently requiring correction.

"Many Apothecaries of this city, have long been sensible of the necessity of taking some efficient measures, by which the irregularities and abuses that have crept into their business, should be abolished; and that their profession should be placed on that respectable footing to which it is entitled, by its usefulness to society, and as an important branch of the science of Medicine. With these views, they have founded the PHILADELPHIA COLLEGE OF APOTHECARIES.

"This institution has already established many wholesome regulations for the government of its members, calculated to inspire confidence in all those who are attached to it; and has provided for a course of public instruction, under its auspices, in Materia Medica and Pharmacy, and Pharmaceutic Chemistry, with the intention of adding, ultimately, other collateral sciences. A Cabinet is also forming of choice and selected specimens of Drugs and Medicines, of the best qualities.

"An institution embracing so many subjects of high importance and utility to the Medical Profession, and the public generally, and so well calculated to perfect those objects, cannot fail to meet the approbation and support of the liberal and well-informed practitioner, and every member of society.

"The College announces, that the Courses of Lectures will commence in the first week in November, and will be delivered three times a week, in the evening, during the winter, in the Hall of the German Society, South Seventh Street.

"Lectures on Materia Medica and Pharmacy, by Dr. Samuel Jackson.

"Lectures on Pharmaceutic Chemistry, by Dr. Gerard Troost.

"By order of the Board of Trustees.

"PETER WILLIAMSON,
"Secretary."

From Poulson's *Daily Advertiser,* Tuesday morning, November 6, 1821:

"PHILADELPHIA COLLEGE OF APOTHECARIES.

"The Introductory Lecture to the course on Materia Medica and Pharmacy, will be delivered by Samuel Jackson, M.D., on Friday evening, November 9th, in the German Society's Hall, in South Seventh Street, between Market and Chestnut; and

"The Introductory Lecture, to the course of Pharmaceutic Chemistry, will be delivered by Gerard Troost, M.D., on Saturday evening, November 10th, at the same time and place."

In the following year, 1822, when the College was incorporated, the name was changed from the "Philadelphia College of Apothecaries" to "The Philadelphia College of Pharmacy." This advertisement of several years later will also be found to be of interest.

From the *National Gazette and Literary Register,* Philadelphia, Saturday afternoon, November 13, 1824:

"PHILADELPHIA COLLEGE OF PHARMACY.

"The Lectures in this Institution will commence about the middle of the ensuing month (November), at the Hall occupied by the College, in Seventh Street below Market.

"The Course on Materia Medica and Pharmacy will be delivered by Samuel Jackson, M.D. It will embrace a concise History of the Articles used in, or connected with Medicine; and an exposition of their sensible and medical qualities; their various officinal preparations, and the modes of detecting spurious, or sophisticated varieties.

"The course on Chemistry, will be delivered by George B. Wood, M.D., and will, in addition to the application of this science, to Pharmacy, comprehend a complete series of popular Lectures on Chemistry, illustrated by numerous Experiments, with an extensive Apparatus.

"There is belonging to the College, a large collection of superior Specimens of the various articles comprised in the Materia Medica, which will be exhibited by the Professors to their classes, and are well calculated to add to the interest and instruction of the Lectures.

"Tickets of Admission to be had of William Heyl, Treasurer, No. 215 Market Street, or Daniel B. Smith, Secretary to the College, corner of Arch and Sixth Streets, Price $5.00 each course, and a matriculating fee of $2.00 to be paid by all except apprentices to members of the College.

"By order of the Board of Trustees.

"HENRY TROTH, *Chairman;*
"WILLIAM BAKER, *Secretary.*"

The apparent discord or opposition between the University of Pennsylvania and the Founders of the College has occasionally been magnified and distorted by those unfamiliar with the facts as indicating a long continued and bitter enmity between the University of Pennsylvania and the Philadelphia College of Pharmacy.

Nothing could be further from the truth. It is a matter of record that the University of Pennsylvania, in partial pursuance of its original plan did confer the degree of Master of Pharmacy as an honorary degree upon sixteen Philadelphia Apothecaries in April, 1821. It is illuminating to note that of these sixteen who were so honored, seven were charter members of the newly formed College.

It is also of interest to learn that very soon after the active functioning of the College began, when the members showed the breadth of their aims by conferring honorary membership upon such international authorities as Paris, Chapman, Silliman, Vauquelin, Derosne, Robiquet, Virey, Pelletier, Faraday, Torrey, Nuttall, Brandes, Dobereiner and Trommsdorff, that there was also included the name of Dr. John Redman Coxe, who is credited in the memoirs of Edward Parrish as having been the leading spirit in the original movement by the University of Pennsylvania.

Of interest in this same connection, too, are the tributes of some of the University's own teachers.

In the "Early History of the University of Pennsylvania," written by Dr. George B. Wood in 1834, he states:

"The degree of Master of Pharmacy was instituted a few years since with the very laudable view of improving the profession of the apothecary, which, in the city, has assumed an importance far beyond what it possesses in other parts of the United States. Any person is entitled to the degree who shall have served an apprenticeship of at least three years with a respectable apothecary, and attended two courses of lectures on Chemistry and Materia Medica in the University. Advantages would no doubt have accrued from this accession to the original plan of the medical department had it not been superseded by the establishment by the apothecaries themselves of a distinct school, which being under their own management, and directed to the one object of advancing the usefulness and respectability of the profession, is naturally more popular, and at least equally efficient."

Later, Dr. Joseph Carson, in his "History of the University of Pennsylvania," published in 1859, says:

"This procedure on the part of the University, in the matter of improving and elevating the practice of pharmacy, aroused the enterprising spirit of the druggists and apothecaries of Philadelphia, and incited them to found the College of Pharmacy, an independent institution, which, through the instrumentality of its school, and of its journal, and by its vigilance with reference to the conduct of its members, has been of incalculable service to the profession of pharmacy, not only in the city of Philadelphia, but throughout the United States."

And now in our own time comes this congratulatory tribute from the one who has guided the destinies of the University of Pennsylvania for the preceding decade and who has been associated with its work for more than thirty years:

"The 100th birthday of the College of Pharmacy is now here. My congratulations are herewith extended to the College and its many children. It is pleasant to recall that from its beginning the University of Pennsylvania and the College have sustained the most cordial relations. Sons of the University and many of its professors worked in the ranks of the College.

"I think it is conceded that this harmonious co-operation has redounded to the good of each institution. The eminent Botanists and Chemists of the two foundations have mutually sustained and encouraged one another in their several efforts to advance the interests of their respective sciences.

"For myself, I can only say that the career of the College of Pharmacy during my intimate knowledge of it has been most inspiring. It has stood for the best in every direction. The glories of its past I shall not dwell upon Others will do that. Its advancement is surely a joy to its many friends in this city and to the active promoters of science everywhere. I'm certain the University of Pennsylvania joins me in its well wishes for a still more glorious future.

"Rejoicingly and faithfully yours,

"EDGAR F. SMITH."

And now, as the time comes for me to close, with the inspiration which comes from such surroundings and such glorious traditions and records I can think of no more appropriate lines than those of Kipling in his "Fathers of Old," for he has crystallized for all time the thought that is uppermost in our minds and hearts—reverence for the past and inspiration for the future.

OUR FATHERS OF OLD.

Excellent herbs had our fathers of old—
Excellent herbs to ease their pain—
Alexanders and Marigold,
Eyebright, Orris and Elecampane,
Basil, Rocket, Valerian, Rue,
(Almost singing themselves they run)
Vervain, Dittany, Call-me-to-you—
Cowslip, Melilot, Rose of the Sun.
Anything green that grew out of the mould
Was an excellent herb to our fathers of old.

Wonderful tales had our fathers of old
Wonderful tales of the herbs and the stars—
The Sun was Lord of the Marigold,
Basil and Rocket belonged to Mars.
Pat as a sum in division it goes—
(Every plant had a star bespoke)——
Who but Venus should govern the Rose?
Who but Jupiter own the Oak?
Simply and gravely the facts are told
In the wonderful books of our fathers of old.

Wonderful little, when all is said,
Wonderul little our fathers knew.
Half their remedies cured you dead—
Most of their teaching was quite untrue.
"Look at the stars when a patient is ill,
(Dirt has nothing to do with disease);
Bleed and blister as much as you will,
Blister and bleed him as oft as you please."
Whence enormous and manifold
Errors were made by our fathers of old.

Yet when the sickness was sore in the land,
And neither planets nor herbs assuaged,
They took their lives in their lancet-hand
And, oh, what a wonderful war they waged!
Yes, when the crosses were chalked on the door—
Yes, when the terrible dead-cart rolled,
Excellent courage our fathers bore—
Excellent heart had our fathers of old,
None too learned, but nobly bold
Into the fight went our fathers of old.

If it be certain, as Galen says,
And sage Hipprocrates holds as much—
"That those afflicted by doubts and dismays
Are mightily helped by a dead man's touch,"
Then, be good to us, stars above!
Then, be good to us, herbs below!
We are afflicted by what we can prove,
We are distracted by what we know.
So—ah, so!
Down from your heaven or up from your mould,
Send us the hearts of our fathers of old!

PHARMACY, 100 YEARS AGO.*

By H. V. Arny, Ph.G. (1889); Ph.M. (1919).

Introduction.

All hail! Alma Mater, upon this thy Centennial! Permit one of thy children in the midst of this distinguished assemblage of thy sons and thy daughters to offer a tribute of affection, of esteem and of gratitude. For a century, those entrusted with thy affairs have maintained a great ideal; the conducting of a college of pharmacists, for pharmacists by pharmacists. May this ideal, successfully maintained for one hundred years, actuate thy disciples during the hundreds of years to come.

America, 100 Years Ago.

Eighteen Twenty-One, the year that James Monroe began his second presidential term, the Era of Good Feeling, after an election in which he secured all of the electoral votes save one; the term that brought into being the Monroe Doctrine (1823).

Eighteen Twenty-One, when John Quincy Adams was Secretary of State, the very year he issued his Report on Weights and Measures, in some respects the most remarkable dissertation on metrology ever written.

Eighteen Twenty-One, when John Marshall was Chief Justice of the Supreme Court and was clarifying the Constitution by his illuminating decisions.

Eighteen Twenty-One, when John Adams and Thomas Jefferson were living in distinguished retirement awaiting the Final Summons, which, when it came to both of them upon the Semi-Centennial of the signing of the Declaration of Independence (July 4, 1826), created the most interesting coincidence in American history.

Eighteen Tweny-One, when Philadelphia was the largest city in the United States, a thriving place of over 137,000 inhabitants; when New York ranked second, with over 123,000 inhabitants; when New Orleans, the delightful city depicted in Cable's Grandissimes, had over 40,000 inhabitants; when Cincinnati was a recently

*An address delivered at the Centennial Celebration of Founders' Day. February 23, 1921.

incorporated city of 10,000 inhabitants; when Cleveland was a frontier post of 500 souls; when Chicago was merely a few shacks around Fort Dearborn; when San Francisco was "a vast solitude" as found by Dana in 1835, with its Presidio six miles from the landing place of occasional ships and with its nearest mission four miles away.

Eighteen Twenty-One, when it took two days and a good part of one night, by stage and boat and a night of rest en route, to travel from New York to Washington; and when the "Fast Post Coach" from New York to Philadelphia meant taking a steam ferry at the former city at 6 A. M., riding over to Elizabethtown, and from thence across New Jersey and down the Delaware to Philadelphia, which was reached at 4 P. M.; when steamboat traffic was only fourteen years old; when the Erie Canal (a marvel in those days) was being constructed; when the only railroad in America was a short gravel-carrying concern near Boston; when the first passenger railroad in America (Baltimore & Ohio, 1829) was merely dreamed of; when illuminating gas was merely an experiment in private establishments, such as the Gas Light Tavern, Second and Walnut, Philadelphia, some years before the New York Gas Company (1823) and the Philadelphia Corporation (1836) obtained their franchises.

Eighteen Twenty-One, when Washington Irving, aged 38 years, was sojourning abroad after the successful publication of "The Sketch Book"; when George Bancroft, just back from the famous Georgia Augusta University in Göttingen (the first American to win a Ph.D degree from that institution), had started in as tutor in Greek at Harvard; when Cooper had just published his first novels, the now forgotten "Precaution" and the still famous "The Spy"; when the youngster Poe was at school in Baltimore; when Longfellow, a lad of 14, entered Bowdoin College, after the publication of his first poem (1820); when another boy of 14, Whittier, was attending district school in New England and had been introduced to the beauties of poetry by his teacher, Joshua Coffin, through the medium of a volume of Burns; when Emerson had just graduated from Harvard.

Eighteen Twenty-One, when Daniel Webster was at the beginning of his brilliant career, the orator of the two hundredth anniversary of the Landing of the Pilgrims; when Henry Clay had temporarily stepped out of the speakership of the House of Repre-

sentatives after successfully getting through the Missouri Compromise (1820); when John C. Calhoun was Secretary of War; when DeWitt Clinton was Governor of New York and was directing the construction of the Erie Canal; when Lincoln, Lee and Jefferson Davis were lads of from 12 to 14, unconscious of their future rôle in the sombre drama of 1861-65; when John Jacob Astor and Peter Cooper were amassing those fortunes that were to bring into being the Cooper Institute and the Astor Library.

Eighteen Twenty-One, when Audubon was gathering material for his great work, "The Birds of North America" (published in 1827); when Nuttall, the Anglo-American botanist and erstwhile Philadelphian, published his book, "Travels in Arkansas in 1819"; when Benjamin Silliman, founder of the *American Journal of Science* (1818), was professor of chemistry, *pharmacy,* geology and mineralogy at Yale College.

Philadelphia in 1821.

As mentioned above, in 1821 Philadelphia was the first city of America in population, and a glimpse of the City of Brotherly Love a century since may be worth while. As to topography, it is interesting to note that Southwark seemed to be the southern edge of the city, while we read that in 1826, when Edward Needles started his store at Twelfth and Race, he was called "the frontier apothecary," since across the street as a large field enclosed in a post and rail fence; that in 1829, Wm. Biddle opened a store at Eleventh and Arch Streets, and feared he was making a mistake in going so far into the suburbs; that in 1821, Farr & Kunzi built their new factory at Ninth and Brown, then the outskirts of the city, and that for years after D. B. Smith opened his store at Sixth and Arch, the neighbors took chairs out into the street and sat under the shade of the trees, all of the morning, without being disturbed by a passing vehicle. In appearance it evidently still resembled the quaint town of 1795, so charmingly described by S. Weir Mitchell in his "Red City"—"the single spire of Christ Church rising high over the red brick city * * * the town stretching north and south along the Delaware, and beyond it the woodland * * * Westward on Chestnut Street, pastures, cows, country, and to the north a fine forest known as the Governor's Wood. * * * A mile further * * * a river flowing slowly by." A town where chains were still put across the streets in front of

the four score of churches during service time, to prevent traffic from interfering with worship.

Considering that a city is what its inhabitants make it, a mention of some of its leaders may be in order. There were the four Biddles, Nicholas, the financier; Clement C., the lawyer; James, the naval officer; and Richard, the writer. Nicholas, then a man of 35 years, within two years of his selection as president of the United States Bank, which made him America's foremost financier, until the unfortunate quarrel between President Jackson and the bank officials in 1836. Then there were Stephen Girard, the business man of Philadelphia and New Orleans, who in 1821, was 61 years old, and William Bartram, the famous son of the famous John, still living at the advanced age of 81. Dr. Caspari Wister, the founder of the famous Wister Parties, had been dead three years; Benjamin West, the first American artist, had died in London the year before (1820); while Edwin Forrest, a boy of 14, had already made (1820) his theatrical debut as Douglas in a popular play of that time.

Scientific Philadelphia was as much in the fore then as it had been in the days of Franklin, Rittenhouse and Bartram, and as it is today. The University of Pennsylvania was then in its first flower, and among its faculty of 1821 we note Dr. Robert Hare elected professor of chemistry in 1818, the great experimenter, the inventor of the oxy-hydrogen blow pipe, the great thinker, who, in the light of a disparaging remark made in a certain one of his obituary notices, may have been a century ahead of his time as far as psychic phenomena are concerned; Dr. John Redmond Coxe, professor of Materia Medica (1818-1835), known to all of us as the author of Coxe's American Dispensatory and curiously embalmed in the literature of pharmacy as the deviser of Coxe's hive syrup; Dr. George B. Wood, lecturer in medical chemistry, destined to become the second professor of chemistry at the Philadelphia College of Pharmacy (1822-1831), and one of the founders of "the druggists' Bible," the United States Dispensatory; and Dr. Samuel Jackson, professor of the institutes of medicine (in 1835), first professor of Materia Medica at the Philadelphia College of Pharmacy (1821-1827), author of "Principles of Medicine" (1838), deviser of Jackson's pectoral syrup, eminent physician, whose intimacy with the French pharmacist, Durand, caused many heart burnings among the other druggists of the period. Among the

other scientists of Philadelphia in 1821 were Dr. Franklin Bache, who in 1819, at the age of 27, published his "System of Chemistry," who was chosen as professor of chemistry at Franklin Institute upon its organization (1826), who was professor of chemistry at the Philadelphia College of Pharmacy from 1831 to 1841, who was Dr. Wood's associate in founding the United States Dispensatory, and who was professor of chemistry at Jefferson Medical College from 1841 until his death in 1864. Then there was Dr. Gerard Troost, who, we glean from the scanty material at our disposal, was manufacturing ferrous salts at Cape Sable, Md., in 1817, who had a chemical factory in Philadelphia in 1820, who was professor of chemistry at the Philadelphia College of Pharmacy during the first year of its existence, and who a few years later moved to Tennessee, where he became one of the founders of the University of Nashville.

Pharmaceutical America in 1821.

Very elusive is the biographical data concerning the druggists of a century ago. The first American pharmaceutical publication, the venerable Journal of this college, which has taken a new lease on life under the editorship of Mr. Beringer, did not appear until 1825, and the first volume includes eight fascicles published between that date and 1830. Of the Founders whom we are here gathered to honor, there are three of whom no biographical record has been found. As to the others, from obituaries and from other sources, we glean the following information:

Henry Troth: "The Founder of the Philadelphia College of Pharmacy," as Profesor Remington has called him, had in 1821, a wholesale drug store at Seventh and Market. A capable and progressive man he was, one of the first Philadelphians to burn anthracite coal (which cost $8.40 a ton in 1818), in his open grate; one of the members of the Common Council, from 1827 to 1836, making a vigorous fight for the granting of a gas franchise from 1833 to 1836.

Peter K. Lehman, whose conversation with Mr. Troth as to the proposition of the granting of the Master of Pharmacy degree by the University led to the historic meeting at Carpenters' Hall a century since, had, in 1821, a drug store at Tenth and Market Streets.

CHARLES MARSHALL, the first President of the Philadelphia College of Pharmacy, descendant of a distinguished line of Philadelphia apothecaries, in 1821, had a drug store at 56 Chestnut Street, which he, a man of 77 years, conducted with the help of his remarkable daughter, Elizabeth, who when her father lost his first modest fortune in 1804, encouraged him to start anew with the front room of their house converted into a little shop, which by 1821 had grown into a highly prosperous estalishment.

WILLIAM LEHMAN, elected first Vice-President at the Philadelphia College of Pharmacy organization meeting, had a drug store on Second Street, between Arch and Race. He was a member of the Legislature from 1814 until his death in 1829, when he willed $10,000, a considerable sum in those days, to the Philadelphia Athenæum, inaugurating a custom, followed by too many wealthy pharmacists since that time, of bestowing their largess upon worthy objects outside of the institutions of their own calling.

STEPHEN NORTH was chairman of the Carpenters' Hall meeting and was elected Second Vice-President at the organization meeting of the Philadelphia College of Pharmacy. All that has come to light concerning him is that he was a wholesale druggist and that he died in 1826.

PETER WILLIAMSON, the secretary of the Carpenters' Hall meeting, in 1821, was a partner in the drug store of Klapp & Williamson, Second and Almond Streets. In 1874 he founded the Peter Williamson scholarship, which has been of great service to many young men since. He died in 1886 at the advanced age of 91 years.

DANIEL B. SMITH, the first Secretary of the Philadelphia College of Pharmacy, in 1821, was a partner in the firm of Smith & Hodgson, Sixth and Arch, a store that eventually developed into the business of Bullock and Crenshaw. Mr. Smith is one of the numerous illustrations of the scholar in pharmacy that gives the lie to the flippant opinion handed down in 1912 from the Federal Bench in New York, in which occurred the phrase "druggists all over the country: men of no great learning." Besides his activity in the Philadelphia College of Pharmacy, he became, in 1834, professor of philosophy, literature and chemistry at Haverford College.

FREDERICK BROWN, one of the Founders, in 1821, was a drug clerk, employed by Charles Marshall. In 1822, he started his own successful business, which he continued until his death in 1864.

Among the other Philadelphia druggists of 1821 and shortly thereafter we note the following:

BENJAMIN ELLIS, originally a druggist at Muncy, Pa., in 1821, was studying medicine at the University of Pennsylvania. In 1827, he became professor of materia medica at the Philadelphia College of Pharmacy.

FRANKLIN SMITH, in 1821 or shortly thereafter, had a drug store at Eighth and Walnut. He was the preceptor of Henry C. Blair, who in 1828, bought the Smith drug store and thus established the historic Blair pharmacies.

GEORGE GLENTWORTH, in 1821, conducted, at Sassafras (now Race) and Chester Streets, the pharmacy, the fixtures of which are now exhibited in the College Museum.

ELIAS DURAND, in 1821, was a clerk in Ducatel's famous French pharmacy in Baltimore. In 1825, he opened his pharmacy at Sixth and Chestnut, Philadelphia, which for many years was the most renowned drug store in the city. He was vice-president of the Philadelphia College of Pharmacy in 1844 and contributed numerous papers to the JOURNAL.

As to pharmacy in Boston in 1821, a delightful series of thirteen papers by W. A. Brewer that appeared in the *Pharmaceutical Record* in 1884, gives the most vivid picture of the time that has as yet been found. The series tempts one to make numerous quotations, but at this time it can only be stated that Mr. Brewer began his pharmaceutical apprenticeship in June, 1821, in the wholesale drug store of Bartlett and Brewer on Washington (then Cornwall) Street, Boston. He states that at that time the wholesale firm of Rice, Henshaw & Company was the largest drug distributors in the United States; that David Henshaw later became Secretary of the Navy; that in 1821, there were in Boston seven wholesale and twenty-three retail drug stores, among these being those of George Brinley, Robert Fennelly, Charles Nolan, John I. Brown (of bronchial troches fame), Maynard and Noyes, Love and Reed;

Dr. Ballard, Cyrus Holbrook, Charles White, Ephraim Elliot and Thomas Greenleaf.

As to the New York druggists in 1821, those whom we still recall are Schieffelin & Company, then a firm of twenty-seven years standing; John Milhau, who in 1823, retired, spent several years abroad and then returned to open the famous Milhau Pharmacy on Broadway; and Benjamin, Quackinbush, Greenwich and West Tenth, whose store is still run by his descendants. From the city directory of 1821 and from other sources we learn that among the other New York apothecaries of that time were Peter B. Brown, Grand and Cannon Streets; Hull and Bowne, 146 Pearl Street; J. H. & W. B. Post, 41 William Street; James Seaman & Company, 49 Fulton Street; and Isaac See, 325 Greenwich Street.

For information as to the druggists of Cincinnati of 1821 we are indebted to an interesting historical sketch by Joseph Feil, in which are given from the newspapers of 1818 and 1819 advertisements of T. W. Dyott, wholesale drug and medicine warehouse; Caleb Bates, Lower Market Street; and Hallam & Clark. Of the other American cities the information is only fragmentary. Thus we learn from obituaries and from patent medicine advertisements that Ducatel's pharmacy was one of the leading drug stores of Baltimore; that William Gunton was established in Washington; that E. & R. H. Stabler conducted the drug store in Alexandria, from which sprang R. H. Stabler, the eighteenth president of the American Pharmaceutical Association; that William McKean was established in New Orleans.

As to the actual drug business of 1821, we have a mirror of its materia medica in the United States Pharmacopœia of 1820. The druggist made almost all of the medicines that he dispensed. Thus the U. S. P. 1820 provided recipes for such chemicals as prussic acid, sulphuric ether, silver nitrate, bismuth subnitrate, calomel, corrosive sublimate and zinc oxide (flowers of zinc), and record shows that independent chemical works were just in the process of organization (*e. g.* Farr and Kunzi, 1818; Rosengarten & Zeitler, 1822). All pharmaceuticals were prepared by the apothecary except some special ones, mainly of French origin, as at that time the French were the premier pharmacists of the world. Testimony to this effect is given by D. B. Smith concerning Charles Marshall, while it can be added that the tremendous vogue of Elias Durand was due to the fact that he was a French-trained pharma-

cist and could prepare pharmaceuticals of an elegance almost equalling that of the French preparations. In a curiously fragmentary contribution from S. F. Troth, he brings out that the first really nice Epsom Salt was brought from England to Philadelphia in 1821; that the first sodium bicarbonate purchased by Henry Troth, in 1821, cost $1.25 a pound; that tartaric acid was a novelty in 1821, and cost $1.25 a pound; and that about that time druggists had their English magnesium carbonate calcined to the oxide in the furnaces at Adam Miller's pottery on Zane Street. From an advertisement of a Cincinnati druggist we learn that in 1819, beeswax cost 20 cents a pound; cassia, 70 cents; ginger, 30 cents; and sugar, 28 cents. Another Cincinnati advertisement of 1819 announces the receipt from Philadelphia of a consignment of Milnor's Acid Lemon for making lemonade, and of Farr's Soda Powder for making soda water. In passing it might be stated that the first American quinine was made in 1823 by Farr and Kunzi, the firm that eventually developed into the Powers and Weightman factory.

Pharmaceutical Thought in 1821.

To discuss the general trend of science in 1821 would exceed the limits of this paper, so there is no need of going further in this direction than to cite what Edward Parrish said fifty years ago today, to that effect that in 1821 the labors of Davy, Ampere, Dalton, Berzelius, Faraday, Oerstedt and Arago had reached their culmination, thus laying the foundations of modern chemistry.

William Procter pointed out the difficulty in making a history of pharmacy of the 1821 period, since the only pharmaceutical journals then reaching this country were French. It has been the privilege of the writer of this paper to scan the *Journal de Pharmacie* for 1821, and also two German year books of pharmacy of the same period, Kastner's *Berlinische Jahrbuch* and the *Scheidekunstler und Apotheker Almanach.* From these sources considerable interesting information has been obtained; among it the fact that in France, the available journals of science, besides the *Journal de Pharmacie,* numbered seventy. Of these only one was pharmaceutical (Trommsdorff's *Journal der Chemie and Pharmazie*) and only one came from America *(Journal of the Philadelphia Academy of Sciences).* In the two German Year Books are lists of books and periodicals received by the editors during the

year. Among the periodicals we note Trommsdorff's *Journal der Pharmizie* and Buchner's *Repertorium.* As to books, over eighty titles are given.

Turning to the problems under discussion it is plain to see that 1820-1821 were alkaloidal years. Sertürner's discovery of morphine, the first isolated plant base (1816), had stimulated research in that direction and as a result we find in the periodicals of a century ago, first of all, the classic paper of Pelletier and Caventou on quinine, a dissertation covering forty-eight printed pages; a paper from the same authors on veratrine, and one from them on strychnine; Meissner's article on sabadilline; Brandes on daturine, on delphine and delphinine and on atropine; Pelletier on veratrine; Oerstedt (son of a Danish apothecary, the great electrician and chemist), on piperine; Desfosses on solanine; Thomsen on the combustion assay of morphine, and Brandt and Meissner on atropine. As novelties in the way of elements we note cadmium, thorium, lithium and selenium. As new drugs, are described Asarum Canadensis (used then in the United States for tetanus) guarana, arrow-root, scutellaria (used then in the United States for hydrophobia lactucarium, Borneo camphor, chiretta and pareira brava. Then there are given, among other analysis, that of krameria by Gmelin; of ambergris by Pelletier and Caventou; of Tonquin musk by Blondeau and Guibourt; of cubeb by Pelletier; of Fucus vesiculosus by Coindet (pointing out that its medical action in goiter is due to its iodine content); of serpentaria by Chevallier; of saffron by Henry (noting presence of polychroit); of santonica by Boullon-LaGrange (describing its volatile oil); of cochineal by Pelletier and Caventou (giving method of preparing carmine; of yellow wax by Buchholz and Brandes; of colocynth and star anise by Meissner; of myrrh by Brandes; and of saffron by Aschoff. An unexpected paper is one on the "Atech-Gab" of Baku, in which the words "petrol" and "napthe" are used, and in which it is stated that the "petrol" is used by the poorer classes of Persians as a lamp oil. Some forty years later (1859) Pennsylvania petroleum became the great commodity which has made it world-famous ever since.

Of papers published by Americans we find four; one by Spalding (the scutellaria article cited above), one by Hare on a theory of galvanism, one by Rafinesque on atmospheric dust, and one by

John Gorham, professor of chemistry at Harvard, on the constituents of maize.

There are some unusual items, including a complaint concerning a blind prescription written by a Parisian oculist which could be compounded at only one pharmacy. The prescription called for 6 grains of "purified salt of cadium" in 6 ounces of orange flower water. Because of the extreme rarity of the cadmium compound, the pharmacist charged 4 francs 50 and then, alas, dispensed 6 grains of zinc sulphate. So some of our pharmaceutical predecessors were not so guileless, after all. Another writer rails against factory-made pharmaceuticals, pointing out that one firm sold Baume Tranquille (infused oil of hyocyamus) for 1 franc 20 a pound, whereas the oil of which it was made, when of proper quality cost 1 franc 60. It is also interesting to note that while the metric system was supposedly adopted in France in 1793, thirty years later (1821), practically all matters concerning weight were expressed in pounds, ounces and grains. This should show us metric advocates that it takes a long time to teach a people new ways; it should also show us that patient and persistent effort finally brings a people to the new and better way.

There are two interesting papers which discuss the pharmacists of the past. One calls attention to the fact that the fern genus Darea is named after the English pharmacist Dare; in the other mention is made of Apothecary Rouvier as author of a book of voyages; of Apothecary DeMach, as a poet; of Apothecary Guairet as a Latin versifier, and of Apothecary Baumé as the author of a grammar. All of these worthies (all forgotten except Baumé) are discussed in a review of a book on metaphysics published in 1821 by Apothecary Opoix. Here is a good lead for the pharmaceutical historian.

In another paper we find a complaint that works on pharmacy are being written in the vernacular rather than in Latin, a really valid reason for the objection being that when written in the vernacular any charlatan can read the various recipes and thus become druggists, whereas when in Latin, only the truly educated can become apothecaries.

As to books, the first national pharmacopœia, the French Codex, had appeared in 1818, followed toward the end of 1820 by the first United States Pharmacopœia. The great book on pharmacy of the day was by the French pharmacist, Virey, who interestingly

enough had been accused by the Government of appropriating too freely material found in the Codex. At his trial, however, he was acquitted of the charge. The great book for American druggists was Thatcher's American Dispensatory; our present classic, the United States Dispensatory, not appearing until 1833. The most important book on general chemistry was Thomson's System of Chemistry, an English work in four volumes, that was first published in America in 1818. Another classic was Ure's Dictionary of Chemistry, the first American edition of which (edited by Robert Hare and Franklin Bache) appeared in 1821.

The Medical Botany of William P. C. Barton, a handsome volume with beautiful colored illustrations of medicinal plants drawn by the author, appeared first in 1818, with a second edition dated 1825. It is interesting to note the 1818 edition was published by M. Carey & Son, while the 1825 issue was distributed by Carey & Lea, the predecessors of the present firm of Lea & Febiger.

A remarkable book, published around 1821, is a neatly bound volume of 161 pages, extolling the virtues of Swaim's Panacea. After a description of this marvelous concoction by Swaim (a Philadelphia bookbinder), the rest of the volume is taken up with testimonials written up as "reports of cases" from physicians, including such celebrites as Drs. Valentine Mott, Parke (both delegates to the Pharmacopœial Convention of 1820), Dewee and Hall, the latter a member of Congress from North Carolina. There was evidently no Council on Pharmacy and Chemistry in 1821.

Pharmacy of 1821 and Pharmacy of 1921.

A comparison between the pharmacy of today and the pharmacy of a century since would constitute a paper in itself, so merely as summary it may be here stated that while pharmacy of 1821 was the art of compounding medicaments and the sale thereof; the retail pharmacy of 1921, the age of the machine-made goods, is largely the art (or science, if you will) of salesmanship, the distribution of the products of other men's hands. Deplore it as we will, the machine has largely replaced the man in our calling as in many others. The druggist of 1821 was a merchant of standing, who served his customers with products made in his back room of his store, and in many cases that back room between now and then has grown into a huge factory. The pharmacist of 1921 has four ways in which he may utilize his training: (a) he may be a

clerk in a corporation drug store; (b) he may be a proprietor of a commercial store, where salesmanship is the keynote, even as it is in the corporation store; (c) he may become a prescription specialist, to whom physicians turn for expert advice, even as the physicians of 1821 turned to Marshall, to Milhau, to Durand and to Ducatel; (d) he may be a trained pharmaceutical chemist or pharamacognosist employed in a manufacturing plant. This is not the time to discuss these phases of modern pharmacy beyond the bare statement that the options may be best expressed by the French saying, *chacun á son goût.*

Conclusion.

In 1821, the Founders of the Philadelphia College of Pharmacy began this great institution for the purpose of training apprentices to become honest and efficient druggists. It was an organization of pharmacists for pharmacists, and this ideal has been faithfully upheld for one century. It is not improper to say that whatever faults may be found in the century of stewardship have been due to the faithful execution of this principle. Designed originally to train retail pharmacists, as the decades have rolled by, the College has met changing conditions in such a manner that it continues to be of the greatest and broadest service to all phases of American pharmacy. Thus when the time was ripe, laboratory courses of instruction were instituted, courses that brought inspiration as well as knowledge to those who were fortunate enough to take the work. Thus when the old-time apprenticeship system began to break down, when the retail druggist became unmindful of his duty as preceptor, when the commercialization of pharmacy in the modern sense, was at its beginning, the College was the first to start a commercial course that even to this day reflects credit upon its originators. And now at the dawn of the new century of its existence, the Philadelphia College of Pharmacy has become the Philadelphia College of Pharmacy and Science. To its old graduates the College will always remain the beloved "Philadelphia College of Pharmacy," but the new name possesses a striking significance. During the last half-century the university movement in pharmacy has brought about the anomalous condition that its exponents seem at times ashamed that they are pharmacists, and manifest an apparent desire to make pharmacy a minor topic in a course supposedly designed to train a young man or woman to be a pharmacist. It

is on a par with certain phases of medical instruction where the aim seems to teach the student how to diagnose a disease and then let him flounder around as to a remedy. The very title the Philadelphia College of Pharmacy and Science puts the proper emphasis upon the valuation that should be placed upon instruction in this and other schools of pharmacy. Pharmacy should be the foremost consideration. A knowledge of other sciences is essential for the trained pharmacist, but, whether retailer, wholesaler, manufacturer or teacher, the graduates of our pharmacy colleges should realize that they are first, last and at all times, PHARMACISTS.

INFLUENCE OF PHARMACISTS ON THE DEVELOPMENT AND ADVANCE OF MODERN CHEMISTRY.*

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Pharmacy as an art ante-dates modern chemistry by several centuries.

Following the era of the alchemists, and at about the end of the fifteenth century, a different turn was given to the study of alchemy, and under the general influence of Paracelsus, experimentation was turned to the study of new medical qualities in various natural substances, and the projects of transmitting the baser metals into gold and silver were practically abandoned for the time. Paracelsus and his immediate followers made many medical and drug discoveries. Indeed, it has well been said that "the apothecary shops of Europe became research laboratories, from which many valuable medical discoveries emanated."

This was the era of the iatro-chemists. Among these names we have, besides Paracelsus, Libavius, in 1595; Glauber, from 1603 to 1668, whose name still remains a familiar one to the chemist of today, and others.

We are accustomed to think of Priestley, who discovered oxygen, in 1774, as one of the founders of modern chemistry, but

*An address delivered at the Centennial Celebration of Founders' Day.

Priestly contributed far less to the advance of chemistry than a Swedish apothecary named Scheele, who had discovered oxygen two years before Priestly, although he had not published his discovery until after Priestly's announcement. Scheele also discovered the important element, chlorine, in 1774, and many other of our most important and valuable chemical substances, such as tartaric, oxalic, citric, gallic and lactic acids, as well as glycerin and many other substances. In fact, the work of this Swedish worker, an apothecary during the whole of his career, represents one of the most conspicuous contributions to the advance of chemistry.

If we take one country after another, and look at the records of discovery of the latter part of the eighteenth century, we will find repeated illustrations of the contributions of pharmacists to the stock of chemical knowledge.

For instance, in Germany, Marggraf who, in 1747, discovered beet sugar, and may be said to have been the founder of the beet sugar industry of the world, was a Berlin apothecary, and made many other chemical discoveries. Klaproth, who is credited with the discovery of four of our chemical elements, started as a pharmacist. Heinrich Rose, one of the great mineral chemists, and later Professor in the University of Berlin, began as a pharmacist, and his father and grandfather before him were pharmacists. Poggendorf, Professor of Physics in the University of Berlin, and a name well known in the literature of chemistry, was for eight years a practicing pharmacist.

Turning to the French list, we have the names of Vauquelin, a discoverer of several of our chemical elements, who was connected with the Paris School of Pharmacy, and Pelletier and Caventou, the discoverers of quinine, and Labarraque also actively engaged in pharmacy. The great Pasteur, whose services to chemistry and preventive medicine are universally recognized throughout the world, was an apothecary and not a chemist in the beginning of his career.

Two of the most eminent chemists of our own day, namely, Berthelot and Moissan, were both professors in the Ecolé Superieure de Pharmacie in Paris.

Similarly, one of the great lights of English chemistry, in the beginning of the last century, Sir Humphrey Davy, who is credited with the discovery of some seven or eight of our chemical elements, was an apothecary's clerk in the beginning of his career.

Indeed, in both France and England, the recognition of pharmacists as investigators has been notably greater than in any other country. The finest chemical laboratory in London, namely, that of the Imperial College of Science and Technology, had as its first professor of chemistry, one who had the responsibility of constructing the newly established laboratory, the late Sir William Tilden, who began as an apothecary, and for many years was connected with the chemical laboratory of the Pharmaceutical Society of Great Britain. He published, in 1916, a most interesting and valuable book covering the whole range of chemical activity, the title of which is "Chemical Discovery and Invention in the Twentieth Century," which book is one of the most suggestive and readable books to those desiring to get the survey of the broad scope of chemistry and its applications that can be found at the present time.

With this survey of the history of the relations of pharmacists to the development of chemistry in earlier times, as well as in recent times in Europe, we can now come to consider how far this relation has existed in this country.

Speaking in this hall of the Philadelphia College of Pharmacy, and in connection with an anniversary of the founding of this institution, it seems very proper for us to consider what illustration of our subject we may find right here in our past history as an Institution.

Among the most cherished memories of this Institution are those of some of its earliest workers, and in that connection we may call attention to the fine record of one of the earlier professors of this Institution, namely William Procter, Jr., who, though a busy practicing apothecary and a teacher, yet found time to carry on many investigations which advanced chemical knowledge very notably. The value of these was also recognized in much wider circles, and gained for him recognition on the part of foreign chemical authorities. His discovery of the composition of winter-green oil, and of the characters of the salicylic acid derived from the same, were recognized as furnishing the earliest knowledge on this subject.

We may also refer to the long series of contributions to chemical knowledge that have appeared in the AMERICAN JOURNAL OF PHARMACY published by this College for nearly a century past.

Coming down to the present time, we still have very active

workers from the ranks of pharmacy, whose present contribution to chemical science are cordially recognized. While it would be invidious to attempt to select names in this connection, I will only mention two, both of whom are well known to us, namely Professor John U. Lloyd, a recognized authority on plant chemistry, and more recently upon colloid chemistry reactions, and Frederick B. Power, a graduate and former instructor in this College, who is recognized both in England and in this country as probably the first authority upon the subject of essential oils. He is still active in the Government service at Washington on this subject.

The direct influence of pharmacists on the creation of chemical industries is, however, most readily illustrated by a study of the history of the development of manufacturing chemical industries in this city of Philadelphia, which has been known for many years as a great chemical manufacturing center, and I will therefore in some detail review the development of Philadelphia's chemical industries.

"Probably the first to inaugurate the manufacture of chemicals, as such, in this country, was the firm of Christopher, Jr., and Charles Marshall, sons and successors of Christopher Marshall, an early druggist and one of the original 'fighting Quakers' of Philadelphia. This firm had, as early as 1786, entered quite extensively into the business of making muriate of ammonia and Glauber's salt. The factory is described by Watson, in his "Annals of Philadelphia,' as being a grim and forbidding-looking building on Third Street, near the stone bridge over the Cohocksink Creek. This firm is said to have developed an annual output of upwards of 6000 lbs. of muriate of ammonia; quite an achievement for that time."

Let us now take up the beginnings of the manufacture in Philadelphia of one of the fundamentally important chemicals, viz., sulphuric acid. This substance is recognized as the basis of all chemical industries and its manufacture must precede that of most other chemicals. The theory of the lead-chamber process was already understood by chemists, by the middle of the eighteenth century. Ward had made it in England in 1740 on a large scale in glass vessels, and Dr. Roebuck first used leaden chambers instead of glass in Birmingham in 1746. The first leaden chamber was erected in France, at Rouen, in 1766.

Mr. John Harrison, the son of Thomas Harrison, a member

of the Society of Friends, was an early Philadelphia druggist who had completed his education by spending two years in Europe, in part under the instruction of Dr. Joseph Priestly, the famous English chemist. Upon his return he began, in 1793, the manufacture in Philadelphia of various chemicals, and notably of sulphuric acid. He had at first a lead chamber capable of producing 300 carboys of acid per annum, and his laboratory at this time was on the north side of Green Street, west of Third. In 1804, he established a new factory at Second and Huntingdon Streets, near Frankford Road, Kensington, but continued for a time the work on Green Street. In 1807, he built what was for that time quite a large lead chamber; it was 50 feet long, 18 feet wide, and 18 feet high, and capable of making nearly 500,000 lbs of sulphuric acid annually, the price of which was then as high as 15 cents per lb.

"As is well known, acid produced in lead chambers is not the Oil of Vitriol of commerce, and the only method known at that time to concentrate it to the required strength was by boiling it in glass retorts—a very precarious and dangerous process. The constant breakage of the glass largely increased the cost of the concentrated acid and the danger of the work. To obviate this great trouble, Mr. Harrison, in 1814, introduced the use of platinum for the manufacture of sulphuric acid, for the first time, at least in this country. In the previous year, 1813, Dr. Eric Bollman, a Dane, had come to Philadelphia. Dr. Bollman was familiar with the metallurgy of platinum, and a highly scientific man. He brought with him from France Dr. Wollastron's method for converting the crude grains of platinum into bars and sheets. About the first use that Dr. Bollman made of these platinum sheets was the construction early in 1814, of a sill for the concentration of sulphuric acid for the Harrison works. It weighed 700 oz., had a capacity of 25 gal. and was in continuous use for fifteen years. This early application of platinum for such purposes was highly characteristic of the sagacity and ingenuity of the American manufacturer. At the time the use of this rare metal was a novelty in Europe and known only to a few persons and certainly entirely unknown in this country. It follows, therefore, that Mr. John Harrison was not only the earliest successful manufacturer of sulphuric acid in America, but the first in this country to concentrate it in platinum."

Farr and Kunzi were next in Philadelphia to follow the lead of Harrison in making sulphuric acid, which it is stated they did in

1812, and shortly thereafter Wetherill & Bros. also began the manufacture of sulphuric acid on the east bank of the Schuylkill River. Chas. Lennig, the founder of the present firm of Chas. Lennig & Co., Inc., also began the manufacture of sulphuric acid in 1829, Rosengarten & Sons shortly thereafter, and Carter & Scattergood in 1834, also were early manufacturers of sulphuric acid.

Nitric acid, under the name of *aqua fortis,* is mentioned in Scharf & Westcott's "History of Philadelphia" as made by Christopher Marshall, Jr., a Philadelphia druggist, at the close of the last century. A communication from Mr. Thos. Skelton Harrison says his grandfather, John Harrison, began to make both nitric and muriatic acids in 1804. Carter & Scattergood had it on their list of manufactures in 1834. Muriatic acid is also mentioned as made by this latter firm in the year 1834, as were tartaric acid and citric acid.

Manufacture of Paint Colors.

The first white lead factory of Samuel Wetherill & Sons was built in 1804 at the corner of Broad and Chestnut Streets, but it was burned down a few years later, and in 1808, they erected a new factory at Twelfth and Cherry Streets.

"His son, Samuel Wetherill, Jr., was the active man of the concern, and assisted his father in all business matters. The enforced experience which was pressed upon them during the revolution, concentrated their attention upon the manufacture and sale of chemicals, and they went into the drug business. In 1785, Samuel Wetherill & Son were located in Front Street, above Arch. Here, for many years, 'Wetherill's Drug Store' was an old landmark, and the place at which sons and grandsons were brought up to the business. The Wetherills were the pioneers in the manufacture of white lead. They established it before the year 1790. They erected extensive white lead works near Twelfth and Cherry Streets, which were burnt down in 1813, but afterwards rebuilt.

"The fire which destroyed the white lead works proved to be incendiary and started by a young English officer the day before he sailed for England.

"In October, 1811, Samuel Wetherill, Jr., obtained patents for a new mode of washing white lead and for screening and separating metallic from corroded lead in the process of making red lead, and using the first machine ever used for manufacturing purposes

in the United States. This method has been generally adopted and used by all makers of lead.

"The name of the first white lead firm was Samuel Wetherill & Son, Samuel Wetherill, Jr., evidently being the active member. After his father's death in 1816, Samuel Wetherill, Jr.'s, sons joined the business and the firm became Samuel Wetherill & Sons. After the death of Samuel Wetherill, Jr., in 1829, it became Wetherill Brothers. The store of the firm was at 65 North Front Street; the warehouse and mill of the old establishment were on Coomb's Alley, back of Second Street.

"When the residence part of the city spread to Twelfth and Cherry Streets, Samuel Wetherill, having bought ten acres of land on the bank of the Schuylkill River, below Chestnut Street, moved there in 1847; his sons (Wetherill and Brother) built the white lead and chemical works and continue to this day."

John Harrison also began the manufacture of white lead in 1806. The firm of Mordecai & Samuel N. Lewis, which afterwards became John T. Lewis & Brothers, also began the manufacture of white lead in 1812, making three Philadelphia firms manufacturing paint colors at that time. These three earliest manufacturers of white lead and paint colors or their lineal successors have continued in business to the present time, for considerably over a century, and have done much to give Philadelphia its long-continued prominence as a chemical manufacturing center.

One of the lines of manufacture that contributed to make Philadelphia a great chemical center early in the last century was that of the yellow and red prussiates of potash. I have been furnished a private memorandum concerning the activities of the firm who began this industry and were active in it for many years.

"Under the firm name of Carter & Scattergood, a profitable chemical manufacturing business was conducted from 1834 to 1911; and was absorbed in the latter year by The Henry Bower Chemical Mfg. Co.

"John Carter and Joseph Scattergood bought out the old-established business of 'John & Daniel Elliott' founded in 1754 by their grandfather, John Elliott.

"Jos. Scattergood graduated P. C. P., 1829.

"The Elliotts' place of business and factory was originally on Front Street, between Chestnut and Walnut Streets, but in 1812, the manufacturing work was transferred to a new factory which

they erected at Nineteenth and Pine Streets, John Carter becoming their apprentice January 1, 1816.

"The list of chemicals produced by Carter & Scattergood was an extensive one, John Carter being the manufacturer and Joseph Scattergood, the business man of the concern. It included citric, tartaric, oxalic, nitric and sulphuric acids, bichromate and prussiates of potash and many other articles, but their operations during the first ten years of their business were on a scale which in this day would be considered quite small.

"Yellow prussiate of potash was first made by them in 1834 (that being, so far as known, the first production of the article in America), but the demand was very small, only 472 lbs. being absorbed by the market in that year. In 1835, the sales increased to 6443 lbs., but it was not until 1843 that the demand became large, the sales amounting in that year to 69,470 lbs. and rapidly increasing in the next two years, the sales in 1845 being 207,522 lbs.

"The high price, over 50 cents per lb., and the keen demand, of course, resulted in active competition, and the market for many years was over-supplied.

"In the year 1846, Carter & Scattergood began to produce red prussiate of potash, being the first in America. This was a highly profitable branch of the business until the introduction of coal-tar dyes, as substitutes for prussiate colors on woolen goods, gradually displaced it in the most important field of consumption. Except for the manufacture of *Blue-Print Paper,* there is now very little demand for it."

Potash and ammonia alums were first made in Philadelphia by Chas. Lenning in 1837 and by Harrison Bros. in 1840.

Coming now to the early manufacture of medicinal or pharmaceutical chemicals which has long made Philadelphia famous, we find that George D. Rosengarten and Charles Zeitler, as Rosengarten & Zeitler, began the manufacture of chemicals in St. John Street, Philadelphia, about 1822. They were the first to manufacture the alkaloids of cinchona and opium in this country, having begun the manufacture of sulphate of quinine in 1823, of sulphate of morphine in 1832, and strychnine in 1834. The salts of quinine were also manufactured by John Farr in 1825.

These two firms and their successors have had much to do with the establishment of Philadelphia as a chemical manufacturing center. After the withdrawal of Mr. Zeitler, which took place

within a year, Mr. Rosengarten continued alone, later taking in a Mr. Dennis. When this partner withdrew some twenty years later, the firm became Rosengarten & Sons, which business continued until the formation of the present combination with the other large Philadelphia manufacturer of medicinal chemicals, Powers & Weightman.

Farr & Kunzi began the manufacture of chemicals about 1818. Abraham Kunzi, a Swiss by birth, retired in 1838, and the senior partner, John Farr, who had been born and brought up in England, associated with himself Thomas H. Powers and William Weightman, two young Philadelphians who had been in the employ of the firm for some time. The new firm name was John Farr & Co. This was later changed to Farr, Powers & Weightman, and on the death of the senior partner in 1841, the firm name was again changed; this time to the title—Powers & Weightman, by which it was so long known throughout the entire country.

These two firms, in 1905, united under the name of the Powers-Weightman-Rosengarten Co., and continue as probably the best-known manufacturers of general and medicinal chemicals in the United States.

The history of the commercial production of pure glycerin is also of interest in this account of Philadelphia's chemical achievements.

The late Robert Shoemaker, while making medicinal plaster, had his attention directed by Professor Wm. Procter to the residuum liquid which was obtained. From this he prepared the first glycerin made in this city, if not in America, in 1846, and this was exhibited by Professor Procter to his class at the Philadelphia College of Pharmacy at that time. Mr. Shoemaker manufactured it for sale, according to his statement, for some years in connection with the manufacture of lead plaster.

The later development of the refining of waste lyes containing glycerin was also a Philadelphia achievement and was worked out by the late Henry Bower. By the courtesy of his son, Mr. W. H. Bower, I am allowed to quote from a private letter, which gives the account of his work, in his own words:

"Quite early in life, say in 1857, my attention was keenly directed to some mode of purifying these waste liquors of the stearine candle factories, and in that year I could have purchased the entire product of crude glycerine

of the United States for a sum not exceeding $5000, although the manufacture of it was nearly if not quite as large then, as now.

"I commenced work in earnest to experiment in purifying glycerine in 1858—and expended long and weary efforts, all my earnings, as well as some borrowed money. I at first succeeded in producing an article sufficiently pure for use in gas meters (in place of alcohol) to prevent freezing and stoppage of the instrument—it was not however until about the middle of 1860 that I succeeded in making and placing in the market a 'pure inodorous glycerine,' even then the amount sold was quite insignificant. Inferior grades made their appearance about the same time in the West. The bland and neutral nature of the article, and the discovery of various uses for it, soon increased the demand to a marked extent; I was enabled from time to time to increase my works, and in increasing them was making steady inroad into the supply of the crude article. At this period, say in 1863, the business of refining glycerine was scarcely known on the continent of Europe, and I exported small quantities to Hamburg paying a profit; Belgium, France, Germany and Austria were immense producers of crude glycerine, but like its sister product here in previous years, it only found its way to the sea. As before stated, the use and sale of the refined continued to improve, the crude growing more scarce each season, until a point has been reached when every available pound is worked into a valuable product. It would not be out of the way to place the total value of all the glycerine sold in the United States at this time at $500,000. This sum could never have been reached had it not been for the discovery of a mode for refining, to which, so far as this country is concerned, I lay claim; by a careful management of my business for some years I kept the process a secret; but in time some portions of it came to the knowledge of other persons, who have been enabled to produce very fair articles. There are besides myself, here, two refiners in Cincinnati, one in Chicago, and one in New York."

There were, of course, other drug and chemical firms who were well and favorably known in the early half as well as the later half of the nineteenth century.

We have already mentioned the name of Christopher Marshall, Jr., who was active in Revolutionary days. Himself the son of a druggist, he was succeeded by his son, Charles Marshall, and his grandson, Charles Marshall, Jr., who in 1814, established himself in the wholesale business at 310 Market Street.

With this Charles Marshall, Jr., entered as an apprentice, Geo. W. Carpenter, who later became one of the most prominent as well as successful of wholesale druggists in Philadelphia. The old store of Carpenter & Henszey at Eighth and Market Streets, I remember quite well as it stood about forty years ago.

A very well-known drug firm of the latter half of the nineteenth century was that of Bullock & Crenshaw. They were the

successors to Smith & Hodgson, who established themselves as druggists at the corner of Sixth and Arch Streets in 1819, where they continued until 1849, when they disposed of their drug business to two of their employees, who then formed the firm of Bullock & Crenshaw. This firm carried on not only a wholesale drug business but handled fine chemicals and chemical apparatus, supplying many colleges and schools throughout the country. In September, 1868, they moved to 528 Arch Street, where in larger quarters they carried on a flourishing business until the death of Mr. Chas. Bullock, the surviving partner.

The firm of French, Richards & Co. was for many years one of the best known of Philadelphia drug firms at its centrally located store, Tenth and Market Streets. The founder of this firm was Clayton French, who, in 1840, entered the drug business as an apprentice with Dr. Edward S. Wilcox. This firm was disbanded in 1890 on the death of its founder, but in the meantime its extensive cement and plaster department, which was started in 1852 at Callowhill Street and York Avenue, had been erected in 1883, into a separate business under the name of Samuel H. French & Co. This has since developed into a very extensive cement, plaster and dry color firm, now under the leadership of Howard B. French, a son of Samuel H. French of the original French, Richards & Co. firm.

URETHANES OF THYMOL AND CARVACROL.

By D. C. L. Sherk.

METALLIC DERIVATIVES OF NITROSOPHENOLS.

By Brandel's [18] modification of the method of preparing nitrosocarvacrol and nitrosothymol, it is possible to obtain these derivatives in 95 and 96 per cent. of the theoretical yield, respectively.

The only derivative previously characterized definitely was the silver compound of nitrosothymol. Schiff [19] also obtained the "alkaliphenolates" in the form of long dark yellow needles when a solution of nitrosothymol in potassium or sodium hydroxide was allowed to evaporate slowly in a partial vacuum. Even the carbon dioxide of the air decomposed them. They were not characterized

[18] Kremers and Brandel, *Pharm. Rev.*, 22 (1904), p. 250.

[19] Schiff, Ber., 8 (1875), p. 1500.

further. The derivatives of the heavy metals formed amorphous precipitates:

Pb = yellow
Ca = yellowish-red
Cu = bright green
Zn = yellowish-white
Cd = reddish-yellow
Ag = deep red

Goldschmidt and Schmid [20] obtained the silved salt as a brown precipitate by adding silver nitrate to a solution of nitrosothymol in ammonia, and obtained, on analysis, 37.53 per cent. silver, compared with a theoretical content of 37.72.

For the preparation of alkali derivatives the corresponding nitrosophenol was dissolved in the theoretical quantity of 2N alkali, made up free from carbonate, and allowed to evaporate to dryness in a vacuum desiccator.

Sodium Nitrosocarvacrol. — Nitrosocarvacrol dissolves very readily in sodium hydroxide, giving a clear, reddish-brown solution, and evaporates, leaving a reddish-brown crystalline mass, with some bright green masses forming long thin crystals radiating in clusters. The crystals are ruby red by transmitted light, of rectangular shape, and pulverize to a maroon powder. This substance was stable at 100°. It decomposes suddenly and intumesces slightly on heating to a high temperature with evolution of reddish vapors and leaves a brown oily sublimate. It was dissolved in about six times its weights of absolute alcohol, filtered and precipitated by adding it to a large excess of ether. Reddish crystals appeared at once, and it was obtained as a bright maroon, crystalline powder. Sodium was determined by conversion into the sulphate and calculated to the basis of the substance dried at 100°.

0.3712 g. lost 0.0416 g. at 100°
I. 0.2007 g. gave 0.0635 g. Na_2SO_4
II. 0.2012 g. gave 0.0636 g. Na_2SO_4

	Found	Calc. for $C_{10}H_{12}NO_2Na$
Loss at 100°	11.21 p. c.	$1H_2O$ = 8.23 p.c.
		$2H_2O$ = 15.20 "
Sodium on dried basis I.	11.30 p. c.	11.44 "
II.	11.30 "	

The yield of sodium derivative recovered in this manner was 90.3 per cent. by weight.

[20] Goldschmidt and Schmid, Ber., 17 (1884), p. 2062.

Sodium Nitrosothymol.—Nitrosothymol dissolves in sodium hydroxide only slowly to a clear solution of a reddish-brown color. It forms a bright brownish-red mass of finely needle shaped crystals. It pulverized to a light brown (cocoa) colored powder. This was dissolved in absolute alcohol and poured into an excess of ether. The precipitate was amorphous, at first of rather an olive-green color. It quickly crystallized in brownish-red needles and on drying formed brown or bronze lumps with an orange fracture. It is stable at 100° and the sodium, determined as sulphate, is calculated for the dried product. It decomposes suddenly on heating, intumescing splendidly, and spontaneously with sulphuric acid, giving a red sublimate.

0.4407 g. lost 0.0622 g. at 100°
I. 0.2004 g. gave 0.0618 g Na_2SO_4
II. 0.2013 g. gave 0.0617 g. Na_2SO_4

	Found	Calc. for $C_{10}H_{12}NO_5Na$
Loss at 100°	14.11 p. c.	$1H_2O$ = 8.23 p. c.
		$2H_2O$ = 15.20 "
Sodium on dried basis I.	11.64 p. c.	11.44 p. c.
II.	11.56 "	

The yield of sodium salt recovered in this manner was 95.7 per cent. by weight. It required much ether for its precipitation.

Potassium Nitrosocarvacrol. Nitrosocarvacrol dissolves very readily in potassium hydroxide, giving a clear reddish-brown solution. Evaporation of the solution left a crust of radiating clusters of very fine needles. The mass was blue-black in color, very finely granular and had not dried completely before taking up in absolute alcohol. This is less readily soluble than the sodium compound. It came out from ether as a tar, partially solidifying slowly to a blue-black mass like iodine. The solid is bright and pulverizes to a bright green powder. A tar remained which solidified on exposure. It was dried at 100° and the potassium estimated as sulphate. The mass swelled up slightly on heating and a red-brown sublimate formed.

0.3207 g. lost 0.0231 g at 100°
I. 0.2000 g. gave 0.0762 g. K_2SO_4
II. 0.2004 g. gave 0.0758 g. K_2SO_4

	Found	Calc. for $C_{10}H_{12}NO_5K$
Loss at 100°	7.20 p. c.	$1H_2O$ = 7.66 p. c.
Potassium on dried basis I.	18.42 p. c.	18.00 "
II.	18.30 "	

This was recovered from ether in only 81 per cent. yield by weight.

Potassium Nitrosothymol.—Nitrosothymol dissolves somewhat readily in potassium hydroxide, leaving an oil-like film on the surface. It evaporates leaving a bluish-green mass with a green fracture and not well crystalline. It forms an olive-green powder. When dissolved in absolute alcohol, it begins to come down on adding an equal volume of ether. It forms a bright mass of almost malachite green with a bright fracture. It is stable at 100°, but decomposes spontaneously with sulphuric acid, and on heating, giving a bright red sublimate.

0.4210 g. lost 0.0334 g. at 100°
I. 0.2000 g. gave 0.0756 g. K_2SO_4
II. 0.2040 g. gave 0.0772 g. K_2SO_4

	Found	Calc. for $C_{10}H_{12}NO_2K$
Loss at 100°,	7.93 p. c.	$1H_2O$ = 7.66 p. c.
Potassium on dried basis	I. 18.42 p. c.	18.00 "
	II. 18.44 "	

It was recovered in 91 per cent. yield by weight; ter Meer[20a] prepared the alkali compounds of nitrosophenol itself by allowing a solution of the metal in absolute alcohol to act on an ether solution of the nitrosophenol. He crystallized his products from water and acetone and found them stable towards carbon dioxide in aqueous solution. The ammonium compound was unstable and could not be prepared at all.

The sodium derivative of carvacrol forms the most readily, and is of the finest appearance. It is immediately crystalline by precipitation from ether and drys as a splendid, brown maroon powder. The thymol derivative comes out amorphous at first, but quickly becomes crystalline, and gives needles of much the same color, cementing to lumps on filtration and drying. The potassium compounds give aqueous solutions of much the same color, but blue solids from water and ether. They appear as amorphous oils and the thymol compound crystallizes most readily, contrasting with sodium in this. It comes out easily. Thus on precipitation by ether the order is this:

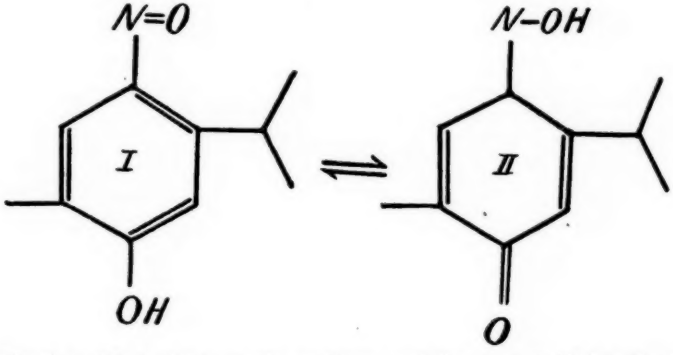
Sodium derivative of carvacrol.
Potassium derivative of thymol.
Sodium derivative of thymol.
Potassium derivative of carvacrol.

[20a] ter Meer, Ber., 8 (1875), p. 622.

This last derivative behaved very badly, yielding an exceedingly deep blue colored amorphous mass, which solidified very slowly.

The difference in color is very striking. ter Meer [21] obtained the potassium salt of nitrosophenol in a similar manner and found it to exhibit another form. It came out as a green amorphous precipitate from ether, which, if moist, passed easily into the red crystalline form. Form alcohol or acetone, it formed thin blue- green plates, sometimes in a red form, probably of a different water content. Beilstein [22] is inclined to doubt this supposition.

The loss at 100° for the potassium derivatives corresponds very closely to that required for one molecule of water of crystallization; while that for the sodium derivatives corresponds somewhat to that required for two molecules of water, as ter Meer found for the sodium derivatives of nitrosophenol itself. This difference does not extend to their aqueous alkaline solution because both the sodium and potassium derivatives give the same benzoyl compound. The difference may be one of isomerism as two forms of the phenol derivative are possible, or it may represent an equilibrium mixture with only a little of one form present with the other.



The first (I) is the true nitroso form, and the second (II) is the "isonitroso" or oxime type.

Structure of Metallic Nitroso Derivatives.—The true nitroso form of these phenols is supposed to exist, because the mixture containing nitrous acid in their preparation may be bright blue or greenish. On the other hand, the blue and red salts or alkali deriva-

[21] ter Meer, Ber., 8 (1875), p. 622.
[22] Beilstein, 3d ed., vol. II, p. 678.

tives have been considered derivatives of the oxime and nitroso types respectively and may be illustrated thus:

Inhaling the powder of these substances effects the mucous membrane of the nose and readily causes sneezing. They are decomposed by carbon dioxide in aqueous solution. The solutions of the nitroso derivatives in the hydrocarbons heptane and benzene were treated with sodium and heated for hours in the water bath, but the action was very slight. No perceptible evolution of hydrogen took place and with the the thymol derivative the sodium retained its metallic luster for weeks in contact with the solution.

The silver derivative of nitrosocarvacrol was prepared by the action of silver nitrate solution on an equivalent of the oxime dissolved in the theoretical quantity of 2N potassium hydroxide. A greenish-brown mush formed, later turning to olive and finally brown. Brandel [22a] prepared this compound in a similar manner, but observed the reverse color changes from brown to green. The precipitate was granular and washed readily at the pump, after which it was dried in the air. It is a brown powder, stable in the air. It is slightly soluble in water and imparts a reddish color after boiling. During heating an odor is apparent and it melts together in the hot water. The yield was about 90 per cent. of the theoretical by weight. It was analyzed for silver by ignition, after drying in a vacuum desiccator. It melts on heating and gives a red-brown sublimate.

I. 0.4048 gm. gave 0.2485 gm. silver.

	Found	Theory for $C_{10}H_{12}NO_2Ag$
Silver	36.64 p. c.	37.72 p. c.

Brandel obtained values for silver of 36.66 and 36.84 per cent., but assigns the formla $C_{10}H_{12}NOAg$ (no doubt unintentional), which requires 39.95 per cent. of silver. In addition he observed a considerable solubility of the silver salt in cold distilled water and separated a precipitate containing 54.36 and 54.1 per cent. of silver. He assigns to it the formula $C_{10}H_{11}NOAg_2$, whereas the silver content required for $C_{10}H_{11}NOAg_2$ is 54.91 per cent. No such combination was observed, however, in this work.

The silver derivative of nitrosothymol has been prepared by Goldschmidt and Schmid.[22b] It was prepared in the same manner as

[22a] Kremers and Brandel, Pharm. Rev., 22 (1904), p. 250.
[22b] Goldschmidt and Schmid, Ber., 17 (1884), p. 2062.

the carvacrol derivative. The color of the precipitate appeared reddish at first, changing to brownish-black. It was filtered and washed with difficulty because it remained gelatinous. After drying in a vacuum desiccator, as with the other, it became grayish-brown and lost its luster. It is bulky and somewhat unstable in light as the exposed surfaces become gray on standing. It has a slight odor; melts under hot water, and the solution also has a slight odor; while its color is bright yellow, with no tinge of red, as with the carvacrol compound. It was obtained in 90 per cent. yield by weight. It was analyzed for silver by ignition. It did not melt, but gave a splendid purple sublimate.

	Found	Calculated
I. 0.4368 gm. gave 0.1707 gm. silver.		
Silver	39.08 p. c.	37.72 p. c.

The colored sublimates obtained on heating all of the metallic derivatives of nitrosophenols are to be considered azo-derivatives; since Beilstein[22c] attributes to Jaeger [23] the statement that nitrosophenol heated with potash to 180° gives azophenol, $C_{10}H_{12}N_2O_2$.

A small quantity of substance was heated gently in a test tube and the sublimate examined to ascertain its character. In every case it was crystalline, but the color varied somewhat and the crystalline form varies, there being at times two or more strikingly different forms of crystals.

The silver compound of carvacrol forms an oxblood or maroon sublimate, which appears as yellowish amorphous droplets that crystallize after a time. The thymol compound gives a bright reddish-purple sublimate, which crystallizes in stellate groups.

The sodium compounds form needles, pointed at both ends, of a very pale brownish or reddish-brown color. Thymol forms in addition rhombic crystals with characteristic surface markings. The potassium compounds give sharp needles appearing in clusters, but the sublimate is blue rather than brown.

BENZOYL DERIVATIVES OF NITROSOPHENOLS.

Part of the interest in the preparation and study of these derivatives lay in the fact that they might throw light on the structure of the alkali derivatives.

[22c] Beilstein, 3d ed., vol. II, p. 678.
[23] Jaeger, Ber., 8 (1875), p. 895.

The thymol compound was first prepared by Schiff [23a] by the action of benzoyl chloride on the potassium salt. The mixture was melted together on the water bath, when it solidified. It was purified and crystallized from absolute alcohol or chloroform as beautiful yellow glistening needles with a melting point of 110° (uncor.). An analysis is given corresponding to the formula $C_{17}H_{17}NO_3$. Godschmidt and Schmid [23b] prepared the same derivative by using the sodium compound. It melted at 110-111°. The nitrogen content is correct. The sodium and potassium compounds give the same derivative. These authors assign the ketone structure to this derivative.

$$C_{10}H_{12} \left\{ \begin{matrix} NO.COC_6H_5 \\ O \end{matrix} \right.$$

These were prepared by the Schotten-Baumann reaction, using one-fortieth mol of reacting substances:

Nitrosophenol 4.5 gm.
Benzoyl chloride 3.5 gm.
Sodium hydroxide 1.0 gm.

The nitrosophenol was dissolved in the equivalent quantity of 10 per cent. sodium hydroxide solution and benzoyl chloride added with shaking till an odor persisted to ensure an excess.

Nitrosothymol dissolves in the sodium hydroxide with evolution of heat. The chloride was added from a pipette and the stoppered flask shaken. The reaction product separated out as orange colored granules, which were not melted by the heat of reaction. It was filtered at the pump and washed with water, and dried over night on paper. The product so obtained weighed 7.6 g. with a theoretical of 7.07 g. It melted at 105°, and after freezing at 97-105°.

This was crystallized from 95 per cent. ethyl alcohol, in which it is readily soluble and crystallizes well.

		M. P.
First crop,	5.47 gm.	109.5–110.5°
Second crop,	0.59 gm. diluted with water.	109.0–109.5°
Third crop,	0.23 gm. Brown tarry.	
Total,	6.29 gm.	
Yield,	89 per cent.	

10.8 gm. nitrosothymol dissolved in the equivalent quantity of 2N potassium hydroxide gave 13.93 gm. benzoyl derivative, a yield

[23a] Schiff, Ber., 8 (1875), p. 1500.
[23b] Goldschmidt and Schmid, Ber. 17 (1884), p. 2062.

of 82 per cent. It was crystallized from 30 cc. 95 per cent. alcohol, but caused trouble by clogging a filter.

The thymol compound is bright yellow, with an orange tint which deepens on exposure—it is somewhat sensitive in this respect —and forms thick needles. It is readily soluble in heptane and crystallizes out as a mush of pale yellow crystals. The solution in alcohol is deep orange, almost brown, but somewhat lighter in heptane. The alcoholic solution develops an odor of ethyl benzoate, showing that alcoholysis takes place.

Nitrosocarvacrol dissolved in the sodium hydroxide with evolution of heat. The benzoyl chloride warmed the reaction mixture and an oil formed which solidified slowly and as a film of brownish-yellow color on the walls. It was washed at the pump and dried. It weighed 7.4 g. It melted between 74° and 85°. This was crystallized from 95 per cent. ethyl alcohol, in which it is more readily soluble than the thymol derivative and crystallizes well.

		M. P.
First crop,	6.013 gm. diluted with water.	87°
Second crop,	.93 gm.	85°
Total,	6.94 gm.	
Yield,	98 per cent.	

10.8 gm. nitrosocarvarol dissolved in the equivalent quantity of 2-N potassium hydroxide, gave 16.39 g. benzoyl derivative with a yield of 96 per cent.

This compound forms rectangular plates with bevelled edges of bright yellow color with orange tint, stable in the air. It is more soluble than the thymol compound. The alcoholic solution is deep orange to brown and develops an odor of ethyl benzoate. The solution in heptane is brownish in color and deposits on cooling or evaporation, yellow prisms.

The characteristics of the sodium and potassium derivatives of nitrosophenols are apparently not different in this reaction, because 10 per cent. sodium hydroxide gave yields that are almost quantitative and the same for 2-N potassium hydroxide.

Alkali	Carvacrol	Thymol
NaOH (2-N) 11 p. c.	96 p. c.	89 p. c.
KOH (2-N) 11 p. c.	96 "	82 "

The brilliant color of these products resembles that of thymoquinone so strikingly that the ketone structure was suggested for them

These compounds should prove more useful for purposes of identification of these two phenols than the nitrosocompounds themselves. These may be derived from the nitrosocompounds in one step. They are easily purified, slightly sensitive to light and air only when moist, and are stable at the melting point. The difference in melting points is 22° compared with the difference of 9° between the nitrosocompounds which are unstable at that point, and nitrosothymol scarcely has a melting point, unless it has been very carefully purified. It is impossible to separate these compounds, and thus thymol and carvacrol in the presence of each other cannot be distinguished. With more stable compounds like the benzoyl or similar derivatives a separation may become possible. The crystalline forms of the benzoyl derivatives are strikingly different also.

OXIMES OF BENZOYL DERIVATIVES.

In view of the fact that the ketone structure has been assigned arbitrarily to these derivatives, which the similarity in color with thymoquinone supports, an attempt was made to prepare an oxime. The molecular quantities, in one hundredth mol, were used. First the alcoholic solution of the benzoyl derivative was treated with hydroxylamine hydrochloride and potassium hydroxide.

Benzoyl derivative,	2.83 gm. in 20 cc. alcohol.
Hydroxylamine hydrochloride,	0.7 gm. in 20 cc. water.
Potassium hydroxide,	0.7 gm.

5 cc. 2N Potassium hydroxide were used and the mixture was heated under a reflux condenser in a water bath for three hours. The orange solution in alcohol turned brown on addition of the alkali and enough was added to give just such a permanent brown color. The reaction mixture was poured into water to dissolve the salt and precipitate the alcoholic solution. The carvacrol derivative first gave an oil which later solidified to a flocculent precipitate. The thymol compound gave a heavy, flesh-colored precipitate at once. The liquid smelled strongly of ethyl benzoate. The precipitates were filtered, washed and dried, and weighed and the melting point determined.

	Weight	M. P.
Carvacrol,	1.54 gm.	142° with decomp.
Thymol,	1.62 gm.	158.5° with decomp.

They were soluble in alkalis and ammonia with a brown color and conducted themselves like the original nitrosophenols. Recrystallized from heptane they melted as follows:

	M. P.	M. P. of nitrosophenols
Carvacrol,	151°	153°
Thymol,	161–162°	160–162°

If conversion into the nitroso derivative be complete, the yield should be 1.79; accordingly that gives:

Carvacrol,	86.0 p. c.
Thymol,	90.5 "

It, therefore, becomes apparent that in the presence of alkali the benzoyl group is split off, regenerating the original nitroso-compound:

The brownish-red color obtained on adding an excess of alkali is apparently that of the nitrosoalkali derivative. Heating in the water bath for three hours is sufficient to complete this hydrolysis. An insufficient amount of alkali might delay this reaction. The filtrates had the odor of ethyl benzoate, strongly, but gave no precipitate on addition of sulphuric acid, and no attempt was made to isolate benzoic acid. The pale yellow color of the liquors showed just a perceptible darkening with sodium hydroxide, which may be attributed to the nitrosocompound remaining in solution.

Next the reaction was carried out in heptane solution, using sodium bicarbonate to liberate hydroxylamine. Equivalent quantities were taken:

Benzoyl derivative,	0.71 gm.
Hydroxylamine hydrochloride,	0.18 gm.
Sodium bicarbonate,	0.21 gm.

These substances were finely pulverized and mixed and 10 cc. heptane added as a reaction medium.

Over night the appearance of both mixtures had changed. The carvacrol reaction mixture contained fine needles reaching to the surface of the heptane. On heating in a water bath the entire mixture became crystalline and granular wih a rim of crystals adhering

to the flask. The thymol reaction mixture formed a mush of crystals that fluffed up and filled the liquid completely. Both mixtures were extracted repeatedly with heptane and allowed to crystallize after each extraction. The carvacrol mixture gave finely granular yellow crystals; while the thymol mixture gave a gelatinous precipitate which filtered with difficulty and dried to a pale yellow film.

		M. P.
Carvacrol,	1st crop	129°
	3rd crop	134–135° no evolution of gas.
Thymol,		146–147° with decomp.

The heptane solution of carvacrol gave a few crystals on evaporation which gradually acquired a bright red color and a peppery odor. That of the thymol evaporated leaving a pale cream colored amorphous film which did not become discolored. It had a very faint peppery odor. The amount of each recovered by crystallization from heptane represented a yield of 68 per cent. for carvacrol and 62 per cent. for thymol.

These substances dissolve in alcohol with a reddish to yellowish color and on addition of water become turbid, and finally deposit crystals. Those for carvacrol are very long hairlike, those for thymol short glistening prisms. The quantity was too small to work with, but melting points were determined.

		Carvacrol	Thymol
1st sample,	Soft	164°	163–165° decomp.
2nd sample,	152°	165–166°	165–166°
Oxime in parallel,	128°	132°	146–149°

These may be the original nitrosocompounds, but they appear to be the same substance.

Alkalis give an immediate red-brown color, showing decomposition, but a precipitate remains even after boiling. The possibility of formation of the dioxime above is considered, but this should be soluble in alkali, and melts after crystallization from alcohol, at 255° with decomposition. This apparently rules out the product melting at 165°. It may be that hydrolysis takes place in such a manner that each gives the same isomeric form, namely, nitrosothymol.

Further quantities of the oximes were prepared, using 5.56 g. benzoyl derivative in 50 cc. heptane. Carbon dioxide was given off very soon, and on standing in the cold pressure developed continu-

ously in the flasks. They were heated for three-fourths of an hour in the water bath. The carvacrol reaction mixture became reddish-brown in color and a granular deposit formed. The thymol mixture formed a mush of crystals that contained both yellow and brown particles. These mixtures were extracted with heptane and the residues washed with ether and tested for hydroxylamine and carbonates. That from the carvacrol mixture gave a wholly negative test with Fehling's solution, but the reaction for carbonates was positive. That from thymol gave positive reactions for both, showing that the reaction was not so nearly complete as in the case of carvacrol.

The ether and heptane extracts were crystallized from benzene, in which the carvacrol compound is very readily soluble and forms spherical aggregates of fine needles. The thymol compound is less readily soluble and forms a thick mush that was somewhat gelatinous. Both are pale yellowish powders stable in the air.

Carvacrol Compound.

From benzene sinters at 110°, melts at 133–136°, turning brown.
From heptane sinters at 110°, melts at 137°, turning brown.

Thymol Compound.

From benzene sinters at 145°, melts at 156–157°, with evolution of gas.
Recrystallized from chloroform sinters at 158°, melts at 158–159°, with decomposition.

These two substances were analyzed for nitrogen by Dumas' method:

Carvacrol derivative 0.3000 gm. gave 30.0 cc. N_2 at 25° and 708 mm.
Thymol derivatice, 0.2556 gm. gave 17.9 cc. N_2 at 26° and 707 mm.

	Nitrogen Found	Calculated for $C_{17}H_{15}N_2O_3$ benzoyl-oxime	Calculated for $C_{10}H_{12}NO_2$ nitroso derivative
Carvacrol,	10.7 p. c.	9.40 p. c.	——
Thymol,	7.5 "	——	7.82 p. c.

It is thus apparent that the benzoyl derivative of carvacrol reacts to form the oxime; while that of thymol does not form the oxime, but is hydrolyzed, regenerating the original nitrosothymol under the same conditions. This accounts for the hydroxylamine remaining in the residual salts of the thymol reaction mixture. Since, therefore, the nitrosocompound exists, the red-brown color with the alkalis is due entirely to this; and carvacrol, because it

behaves similarly, must be broken down to the nitrosoderivative by alkali. It is very interesting to note that apparently nitrosothymol and not nitrosocarvacrol results by this decomposition.

THE ALKYL ETHERS OF THE NITROSOPHENOLS.

The formation of alkyl ethers from the different metallic nitrosoderivatives was undertaken in an attempt to differentiate between the two possible types. Since the nitrosophenols may exist in two forms ethers should exist in two forms also by replacement of the hydrogen by an alkyl radical.

Bridge [24] obtained a methyl ether of nitrosophenol itself in two manners. The silver derivative of nitrosophenol and methyl iodide were allowed to react in dry ether. By the action of the sodium derivative in methyl alcohol on methyl iodide the same compound was obtained. The yield was rather low and much polymerized nitrosophenol resulted.

That the methyl group was in the oxime and not in the phenol group was proven in the case of another derivative, the benzoyl ether, which was obtained quantitatively from quinone and χ-benzylhydroxylamine:

Goldschmidt and Schmid [24a] found that the action of methyl iodide on the silver derivative of nitrosothymol gave only tars from which the original nitrosocompound could be regenerated. An attempt was made to prepare the methyl derivatives of both phenols in a similar manner. Four grams of the silver derivative were mixed with the theoretical quantity of methyl iodide and the mixture warmed with a little alcohol under a reflux condenser. There resulted a brown solution and a very pale residue. The carvacrol reaction mixture was filtered and the residue digested with dilute nitric acid. Chlorides gave a copious precipitate, showing that much of the silver compound remained undecomposed. Boiling with concentrated nitric acid left practically no residue, showing that little silver iodide had been formed during the reaction. The thymol reaction mixture was steam distilled, but practically nothing was separated in this manner.

[24] Bridge, A. C. J., 14, p. 276.
[24a] Goldschmidt and Schmid, Ber., 17 (1884), p. 2062.

The reaction was next carried out with the alkali derivatives in alcoholic solution; 4.5 g. nitrosophenol were treated with 1.5 g. potassium hydroxide in 15 cc. methyl alcohol previously distilled over potassium hydroxide. To this were added 3.6 g. methyl iodide and the mixture tightly stoppered and shaken frequently. By morning crystals had deposited and the reddish-brown color of the solution remained but the odor of methyl iodide had disappeared. The crystals were easily proven to be potassium iodide, and the alkaline reaction had disappeared from the solution. The reaction mixture was allowed to evaporate spontaneously and the white crystals washed free from adhering liquor with ether. Both of the phenols gave brown oils at this point. Carvacrol gave a yield of potassium iodide of 87 per cent.; while that for thymol was lost. The brownish-black ethereal solution was shaken with dilute hydrochloric acid to remove basic constituents. This was made alkaline and again shaken with ether. Both ether solutions were evaporated spontaneously. Nothing appeared from the acid wash liquors.

The oil obtained from carvacrol solidified. The compound is probably the oxime ether. The crystals were pressed between paper and melted at 39° and were stable up to 144°. They are bright yellow or orange crystals of needle shape. The oil from thymol remained liquid. It was accordingly steam distilled. It formed a yellow layer in the distillate lighter than water and came over about as fast as the methyl ether of carvacrol, and accordingly cannot be considered readily volatile as the acetone derivatives have been described.[25] The later distillate came over red and was heavier than water. The aqueous portion was extracted with ether and dried over calcium chloride with no apparent change in the chloride. The separated oil was also dried over calcium chloride when the lumps of chloride began to disintegrate and formed a fine powder somewhat in the manner that calcium chloride forms alcoholates. When the oil itself was diluted with ether and allowed to stand over the chloride, the same change was noticed after ten days.

The analysis of the crystalline methyl derivative of carvacrol gave the following results by Dumas' method:

0.2222 g. gave 15.3 cc. N_2 at 25° and 708 mm.

	Found	Calculated for $C_{11}H_{13}NO_2$
Nitrogen,	7.40 p. c.	7.26 p. c.

[25] Diels and Plaut, Ber., 38 (1905), p. 1917.

The potassium derivatives of the nitrosophenols were shaken with methyl iodide in heptane solution. The odor of the iodide persisted for several days and no perceptible change took place in the alkali derivative. The thymol finally changed to a pale, fluffy powder, but the carvacrol remained as a heavy dark precipitate.

After several weeks in contact with the heptane solution of methyl iodide, the heptane gradually acquired a reddish color and the residue changed, losing its dark, almost black color and forming an adherent precipitate. Apparently the reaction was taking place with formation of colorless potassium iodide.

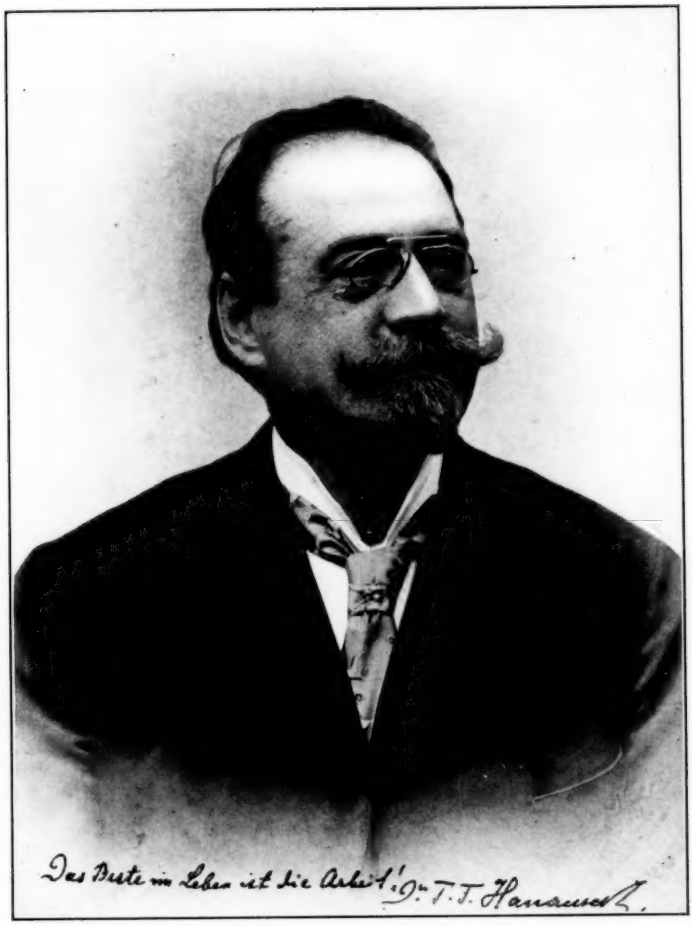
THOMAS FRANZ HANAUSEK.

By A. L. WINTON,

WILTON, CONN.

Dr. Hanausek died at Vienna, on February 4, 1918, in the sixty-sixth year of his age. He was elevated by the Emperor to the rank of Hofrat for gratuitous service in the examination of foods during the war, but the decoration did not arrive until two days after his death. Necrologies appeared in the leading Austrian and German scientific journals, but few if any of these reached America, and his death was not learned by even his close friends at a distance until long after. I was in correspondence with him during 1914 and 1915, but letters became more and more delayed and finally were not transmitted at all. His letters were filled with sad tales of the suffering caused by the war, but were noteworthy for the absence of rancor. He wrote that his only son, a young lawyer in Vienna, had been called to the colors, although he had never served as a soldier because of his weak lungs. "The poor devil," so wrote his father, "must carry 50 kilograms of baggage, a heavy gun, and, what was hardest of all with his short breath, run."

Just before the United States entered the war this same son wrote me from a Russian prison camp, begging that I inform his father, who had not heard from him since he was taken prisoner, that he was alive and slowly recovering from a severe wound. He also asked for literature in the French language to relieve the tedium of his confinement. To both requests I complied, sending



THOMAS FRANZ HANAUSEK.

messages and parcels through official channels, but neither reached their destination. So also the death of his father was unknown to the son until he was released and returned to Vienna.

Rather than detail the events in Hanausek's busy life and compile a long list of his publications, I will attempt to give an insight into his keen scientific acumen and inspiring character by a few reminiscences.

While carrying on some work in Moeller's laboratory at Graz in 1904, I was filled with a desire to meet Hanausek, whom I had come to know through his publications. I accordingly wrote him at Krems-on-the-Danube, begging an interview. When I reached my hotel at Vienna, I found a black bordered letter, not only granting my request but giving full directions as to trains. Arriving at Krems, not knowing he was at the station, I took a conveyance to his house, where he soon joined me. With an awkward click of the heels and stiff bow I apologized for taking his time, but stated that having read and reread his books I was eager to meet the author himself. He at once put me at ease, saying that he had unlimited time when a friend came 4000 miles to see him.

He then inquired which of his books I had. I said *Lehrbuch der technischen Mikroskopie* and *Die Nahrungs- und Genussmittel aus dem Pflanzenreiche.* He turned to his book shelves and took down copies of his *Lehrbuch der Somotologie und Hygiene* and his revision of *Weidinger's Waarenlexikon der chemischen Industrie und der Pharmacie,* wrote my name on the flyleaves, and handed them to me in commemoration of the visit. When I then hinted that I would make my call short, he said I could not get back to Vienna until night and that I was his guest until then. He added, with a sigh, that since his wife's death he lived alone, except for his servants, and he would be glad if I would spend a week or two with him. All of this cordiality to an obscure stranger overwhelmed me.

On my part it was love at first sight and I at once found him the most magnetic man I had ever met. That day lingers in my memory as perhaps the most delightful of my life. A ride into the beautiful Wachau to Dürnstein, where he showed me the castle in which Richard the Lion-Hearted was imprisoned and before which Blondel sang his song—so tradition would have it, although, as Hanausek explained, this was a beautiful myth. Then a visit to the

gymnasium, of which he was director, a dinner such as one eats only in an Austrian home, a discussion of work and workers, postal cards to the latter and, as mementoes, even to ourselves—a wonderful day with a wonderful man.

My translation of his *Lehrbuch der technischen Mikroskopie* was a consequence of this visit.

While in Vienna for a week during the summer of 1914, my wife and I saw him every day. We talked of our work and that of Vogl, Moeller, Tschirch, Von Höhnel, Wiesner, Hartwich and others. We dined at his house, where we enjoyed Frau Hanausek's viands and rendition of Wagner, for she was formerly the prima donna at the Hanover Opera. His beautiful daughter, to whom he once referred as the sunshine of his lonesome life, having gone on the stage, was seldom with him, and his second marriage was a great consolation. Vienna is quite as much the home of applied vegetable histology as it is of music, and it has been my privilege to have drunk of both at the fountain head.

During a visit to the Burg, Hanausek pointed out the windows lighting the corridor, where as a young officer he paced in front of the Empress Elizabeth's apartments during the night watches. At Schönbrunn he showed me where the Emperor Franz Josef then lived and gave me bits of his history learned at close range. Once —a Roman Catholic himself—he spoke dramatically of the influence of the Jesuits on the Crown Prince Rudolf and the resentment of certain classes. I asked if the Emperor himself was not also under the same influence, to which he replied, "Yes, but he is beloved by the people." We little thought that already the plot for the assassination of the Crown Prince had ripened and in a week would be consummated.

After the armistice, when mail routes to Austria were again opened, I sent Hanausek a card to the effect that we were again officially friends, adding that we had never been personally anything else. In due time acknowledgment came from his widow in a touching letter, stating that he died two years before. She said his study was just as he had left it, with books, apparatus, photographs of his friends in place, as it seemed to her that he must come back again. To his friends this sentiment is understandable as his influence so lives with us as to make his death seem unreal.

As a scientist Hanausek was versatile, but never mediocre. He

was alike at home in pure and applied science. His papers on the humus layer of the *Compositæ* published in the *Denkschriften der mathematisch-naturwissenschaftlichen Klasse der kaiserlichen Akademie Wissenschaften* and the *Berichte der deutschen botanischen Gesellschaft* are classics which will survive as long as the study of vegetable histology. In the applied field he has no peer, whatever the branch—drugs, foods, textiles, paper, wood or even horn and bone. The practical examples given in his *Lehrbuch der technischen Mikroskopie* illustrate his remarkable genius in unravelling court mysteries by the aid of the microscope. They read stranger than any detective fiction.

Of my several photographs of Hanausek, I prize most one bearing his signature and the motto to which he owed his success—*"Das Beste im Leben ist die Arbeit"* (The best thing in life is work). He was never idle, and he died in the midst of a busy life.

ABSTRACTED AND REPRINTED ARTICLES

AN EXPERIMENTAL STUDY OF ECHINACEA THERAPY.*

By James F. Couch and T. Giltner. (Pathological Division, Bureau of Animal Industry, U. S. Dept. of Agriculture.)

This investigation was undertaken for the purpose of determining the usefulness of echinacea as a remedy in several pathological conditions induced by bacteria, their products, or allied toxins. The experimental animals used were guinea pigs. The preparations of echinacea employed as remedies were the "Specific Medicine Echinacea" and the "Subculoyd Inula and Echinacea" both prepared and furnished by Lloyd Brothers of Cincinnati, and the Fluidextract Echinacea, N. F. 4. The acute experimental pathologi-

* Author's Abstract of article in *Journal Agric. Research*, vol. 20; No. 1, pp. 63-847, 1920.

cal conditions produced in the guinea pigs were tetanus and botulism (in both of which the diseases were produced by bacterial toxins), anthrax and septiceamia (in both of which the bacteria were injected into the animals), and crotalus poisoning (in which the venom of the rattlesnake was injected). The chronic diseases against which the echinacea preparations were tested consisted of tuberculosis and a trypanosomiasis (dourine), the first of which was produced by innoculation with the bacillus from a human strain, and the second by innoculation with the tryanosomes. The pathogenic materials were carefully selected and were tested for activity and potency so that no animal should receive an excessive dose.

The method of procedure was designed to favor the remedy as much as possible. Both per se and parenteral administration of the remedy was employed. Some of the animals were injected with the pathogenic material and were immediately afterwards treated with the echinacea preparations in suitable doses the treatment being continued until the animals succumbed. Other animals were dosed with echinacea for several days before administering the organism or toxins and then were given remedial doses. Still others were given a few doses of echinacea and were then rested for several days and were finally injected with pathogenic material.

In no one of the diseases treated with echinacea preparations was any evidence obtained to show that the plant exerts any influence upon the course of infectious processes under laboratory conditions. In the two chronic diseases where the animals were given doses of echinacea for extended periods of time nothing appeared in the autopsy pictures which could be attributed to the action of the echinacea per se, except that in two cases a gastric catarrh was present which may have been due to this plant. Every experiment was checked with control animals in sufficient number and, in all cases, the course of the disease was the same in the control animals and in the animals which were given remedial treatment.

It does not appear, therefore, that the preparations of echinacea are of value in the treatment of diseases produced by microorganisms and their toxic products.

COMMENT ON THE PAPER BY COUCH AND GILTNER ON "AN EXPERIMENTAL STUDY OF ECHINACEA THERAPY."

By JAMES H. BEAL.

It is regrettable that a larger proportion of the interesting paper by Couch and Giltner is not covered by the abstract, especially the tables of experiments, since it is from a study of the latter that we are able to appreciate the difference in the methods of deduction commonly employed by the laboratory worker than those employed by the clinician who administers a drug with therapeutic intent.

In these experiments varies authentic preparations of echinacea, or of echinacea combined with inula, were administered to guinea-pigs either prior to or subsequent to intoxication or infection with various poisons or organisms, and the results compared with those observed in control animals with the same intoxications or infections, but which did not receive echinacea treatment.

In the experiments with tetanus 25 animals were each given 3 times the minimum fatal dose of a carefully standardized tetanus toxin. Six of the animals were kept as controls, while the remainder received treatment with echinacea. All of the poisoned animals died, but whereas the average survival period of the controls was approximately 2.25 days, the average survival period of the echinacea treated animals (so far as it can be determined from an inspection of the table) was approximately 2.65 days.*

The authors' conclusion is that "neither the protective treatment nor the remedial treatment, nor a combination of the two appeared to influence the course of the disease," but the average clinician would be inclined to maintain that the results as stated in the table show a perceptible margin of evidence in favor of echinacea treatment.

In the experiments with botulinus toxin, ten times the minimum fatal dose was administered to each of five guinea-pigs, of which two were kept as controls. As shown by the table, the average

*In these calculations the statement "less than 3 days" is taken as 2½ days for both controls and treated animals. Twenty-nine animals were used, but four of them were employed in a side test with alcohol of the same strength as the echinacea preparations.

survival period of the controls after receiving the toxin was 2 days, while the average survival period of the echinacea treated animals was 2.33 days.

The authors' conclusion is that "it does not appear that echinacea possesses remedial value against botulism," while a clinician might urge that the figures in the table actually show perceptible remedial value for the drug in such cases.

In the septicemia experiments 13 animals were subjected to doses of a pathogenic culture of *Bacillus bovisepticus.* Three of the animals were reserved as controls, of which two died and one recovered, the average period of survival of the two which died being 3 days.

Of the ten animals which were treated with echinacea one recovered and nine died, the average survival period in the fatal cases being 3.88 days, an average difference of more than eight-tenths day in favor of the treatment.

The conclusion of the authors is that "in no case did it appear that echinacea either increased the resistance of the organism to the infection or served to modify it when given as a remedy," while the average clinician in reviewing the results would be likely to claim that they showed a decided effect of the drug in prolonging the life of the infected animals.

In the series of experiments with anthrax five animals were inoculated with a suspension of *Bacillus anthracis,* two of the animals serving as controls. All of the animals died, the two controls having an average survival of 6 days, while the average survival period of the three animals receiving echinacea was only 3 days, or just half the period of survival of the untreated animals.

From the table of experiments with rattlesnake poison we learn that nine animals were given a fatal dose of venin, the dose being based upon prior experiments to determine the toxicity of the preparation. Three of the venin poisoned animals were kept as controls, while the remaining six received treatment with one or more preparations of echinacea.

The controls all died, while the animals receiving treatment with echinacea one, or 16.6 per cent. of the number, recovered. Judged by the ordinary methods of clinical deduction, therefore, the chances of recovery of animals receiving a fatal dose of rattle-

snake venin are 16.6 per cent. when treated with echinacea as compared to zero when the animals are not so treated.

From a further study of the table it is learned that the average period of survival of the controls was 2.33 days, while the average period of survival of the echinacea treated animals which died was 3 days, showing a perceptible increase in the survival period of echinacea treated animals over those untreated.

One of the authors' conclusions is that "neither of the echinacea preparations appeared to influence the course of the poisoning," but judged by the methods of deduction ordinarily employed by clinicians, it might fairly be urged that the experiments, though few in number, tend to substantiate the claim that echinacea is of value in the treatment of rattlesnake bites.

In the tuberculosis experiments a total of eight guinea-pigs were inoculated with human type tuberculosis organisms.

The control animals survived for an average period of 23 days after receiving the culture, while the average survival period of the animals receiving echinacea treatment was 31.33 days, an average increase of 8.33 days over the survival period of the untreated animals.

In the same series of experiments the progressive loss of weight of the animals inoculated with tuberculosis culture was noted. In the control animals the loss of weight prior to death averaged 202.5 gm. for each animal, while in the echinacea treated animals, though living much longer, the loss in weight prior to death averaged 156.6 gm. for each animal, or the average loss in weight of the echinacea treated animals was 45.9 gm. *less* than the loss in weight of those not so treated.

The authors conclude that "from these results it does not seem probable that either fluid extract echinacea or the Subculoyd Inula and Echinacea is of value in the treatment of tuberculosis," while a clinician might fairly claim that the results show a marked effect of echinacea, both in prolonging the life of the animal and in retarding the progressive loss in weight.

In the experiments with a trypanosomiasis (dourine), the guinea-pigs were inoculated with a suspension of fresh blood from rats infected with *Trypanosoma equiperdum*. All of the inoculated animals died, but while the average survival period of the controls, as shown by the table, was 51 days, the average survival period of

the animals which received echinacea was 67.16 days, or 16.16 days longer than the untreated animals.

The authors' conclusions are that "neither of these preparations appeared to influence the course of the disease. They certainly have no curative value," while a clinician in reviewing the same experiments might claim that they showed the very decided value of the drug in prolonging the lives of the infected animals.

From the foregoing it is apparent that in every series of experiments, save only those with anthrax, there was a perceptible margin of evidence, clinically speaking, in favor of echinacea treatment in the infections and intoxications experimented with, though it is possible that a restatement of all survival periods in hours instead of days might, in some of the experiments, turn the balance of the evidence in the opposite direction.

While these experiments of Couch and Giltner are perhaps too few in number to be regarded as conclusive, they are of very great value as illustrating the difference in the viewpoints and methods of deduction of the laboratory worker and of the clinician, a difference that may lead to diametrically opposed conclusions from the same observed facts.

POKE ROOT IN MEDICINE.*

By U. Aylmer Coates, M.P.S.

I was very much interested in the article on *Phytolacca decandra* by our Curator, Mr. E. M. Holmes, F.L.S. (*P. J.*, November 6, page 417).[1] My attention was drawn to this drug some ten years since. From my own experience I have found it a very powerful alterative, and serviceable in chronic rheumatism. I have experimented with it in the form of fluid extract; it appears to be very effective in that form. From personal experience I found 3 minims of the fluid extract the best dosage. When 5 minims are taken it upsets the stomach slightly and produces emesia. Poke root is evidently a very powerful drug and worthy of further investigation. My attention was originally drawn to it by an article

* From *Pharm. Jour. & Pharm.*, Nov. 20, 1920.

[1] *Amer. Journ. Pharm.*, Vol. 93 (1921), Jan., p. 47.

in a book written by Frances Peyre-Porcher, M.D., published in 1862, entitled "Resources of the Southern Fields and Forests, Medical, Economical, and Agricultural," Charleston, 1863. By command of the Surgeon-General, the author was released temporarily from service in the field and hospital to enable him to investigate into the medicinal, economical, and useful properties of plants, herbs, and drugs found within the limits of the Confederate States to enable them to be used as substitutes for drugs, medicinal substances, etc., which they were unable to obtain during the American Civil War, and the following is the account of his investigation as to the use and properties of *Phytolacca decandra:*

"The juice of the leaves or berries, inspissated in the sun to the consistence of an extract, will, it is said, discuss hard tumours if applied to the part, 'and destroy cancers by eating them out by the roots' ('Am. Herbal,' by J. Stearns). Mixed with brandy, it is extolled in the cure of rheumatism, easing pain and reducing discharge of the cutaneous and urinary secretions. One ounce of the dried root infused in a pint of wine is said to act kindly as an emetic, in doses of two tablespoonfuls. Bigelow also was of the opinion that it resembled ipecacuanha in its mode of operation; but later experimenters give an unfavourable report, as it is sometimes uncertain, acting too powerfully by accumulation. The pulverized root is also emetic in doses of one to two drachms. 'The tincture of the ripe berries seems to have acquired a well-founded reputation as a remedy in chronic and syphilitic rheumatism and for allaying syphilitic pains.' By some, thought to be more useful than guaiacum. The decoction has been used in scrofula also. A spirit distilled from the berries killed a dog in a few moments by its violent emetic effect, and, according to De Candolle, it is a powerful purgative. The French and Portuguese mixed it with their wine to give it colour, and this was prohibited by Royal Ordinance of Louis XVI 'on pain of death as it injured the flavour.' *Lind. Nat. Syst. Bot.* 210; *Mer. et de L. Dict. de M. Med.*, states that two spoonfuls of the juice of the old plant, which is acrid, will purge violently; applied externally, it will irritate the skin, and it is used in the cure of sanious ulcers, cutaneous eruptions, itch, and hemorrhoids. For the latter affection an infusion is injected per rectum. Drs. Jones and Kollock, of Georgia, assure us (adds Merat) that they cure syphilis with it, in all its stages, without the use of mercury. Dr. Rush relates that several students of Yale College were

severely purged from eating the flesh of pigeons which had fed on the berries. From the analysis in *Annal de Chimie,* lxii., 71, it is shown to contain an enormous quantity of potash—42 in 100 parts—and it is proposed to cultivate it for the manufacture of this article. From later examinations of Dr. E. Donnelly (*Am. Jour. Pharm.,* IX., 168), it appears to contain gum resin 262, starch 20, potash 2, a small quantity of fixed oil, and 66.5 of woody fibre. According to the U. S. Dispensary, it it also somewhat narcotic, and, as an emetic, is considered very slow in its operation, sometimes not acting for several hours, and then frequently upon the bowels; but the vomiting produced by it is not attended with pain or spasm. In over-doses its effects are quite dangerous. As an alterative, the dose is from one to five grains. Dr. Griffith has also used it with success in syphilitic rheumatism ('Med. Bot.,' 535). In the supplement to the Dict. Univ. de M. Med., 1846, 557, it is said to have been used with good effect in paralysis of the intestines. (*Précis des Travaux de l'Acad. de Rouen,* 188, 1838; *Comptes Rendus Hebdom. des Sci.,* lv., 12, January, 1837). The ointment, prepared by mixing one drachm of the powdered root or leaves with one ounce of lard has been applied with advantage in diseases affecting the scalp, as psora, tinea, capitis, etc. Dr. Bigelow was successful with it, and Dr. Haynard cured cases in which sulphur had failed. A gentleman informs me that he has frequently seen the sores of secondary syphilis heal up by the application of a strong decoction of the roots. Dr. Braconnot considers the yellow liquor produced by the juice of the berries one of the most delicate tests of the presence of acids. Dr. Shultz procured from half a bushel of the berries six pints of spirits, sufficiently strong to take fire and burn with readiness. The root of the plant should be dug in autumn, sliced, dried, and kept in close-stopped bottles.

"Dr. R. Moore, of Sumter District, S. C., informs me that the berries of the poke in alcohol or whisky, a dessertspoonful repeatedly given, has been found one of the most efficient remedies we possess in rheumatism. Dr. Ballard, of the same district, has used it with satisfactory results for fifty years. It is very generally employed in this way by many. The root is commonly used, applied externally, to cure mange in dogs. The root should be dug

late in autumn or during the winter, and the powder kept in close-stopped bottles, as it deteriorates.

"An excellent crimson dye is thus prepared ('Thornton's So. Gardener'): To two gallons of the juice of poke berries, when they are quite ripe, add half a gallon of strong vinegar made of the wild crab-apple (ordinary vinegar will do, as the writer has seen) to dye one pound of wool, which must be washed very clean with hard soap; the wool, when wrung dry, is to be put into the vinegar and pokeberry juice, and simmered in a copper vessel for one hour; then take out the wool and let it drip awhile, and spread it in the sun. The vessel must be free from grease of any kind.

"The writer has seen articles dyed successfully with this plant during the present year (1862). The 'Solferino' colour is obtained from it. With alum to fix the colour, I have used the juice of the pokeberry as a red ink. The directions to the printer for this volume were written with this; before adding alum I found that the red colour was fugitive. I consider it, prepared as above, an excellent substitute for carmine ink."

DIAZO-REACTION OF MORPHINE.*

By M. L. LAUTENSCHLAGER.

Morphine and its salts give, with diazobenzene sulphuric acid, made alkaline with sodium carbonate or sodium bicarbonate, a red coloration with increasing intensity as the quantity of the alkaloid becomes greater; a diluted acid changes the color to a yellowish orange. The reaction is yet sensitive in a solution of 1 part in 10,000. The coloring material that forms does not become fixed on the fibers in an acid bath. The reaction is not produced with the other alkaloids of opium; it can be observed neither with heroine nor with dionine, nor with peronine; none of the commoner alkaloids give an analogous coloration. The physiologic action of morphine is destroyed in the course of the reaction. This reaction can be utilized in the toxicologic search for morphine in the presence of its succedaneous or of other alkaloids.

*Arch. d. Pharm., 1910, page 13, through *Annales de Chemie Analytique*, August, 1920, 252. V. O. H.

COCAINE AND STOVAINE, A DIFFERENTIAL REACTION.*

By M. A. MANSEAU.

The chlorhydrate of cocaine and the chlorhydrate of amyleine have reactions common to all the alkaloids and particular reactions that permit of distinguishing them, some of which are given in the Codex for cocaine and in the supplement of the Codex for stovaine. Among the reactions that are common to them, there is only one that presents a special interest because it is capable of characterizing these two substances. It is the action of the weakly alkaline substances such as sodium borate, the alkaline phosphates or better, the lime water of the Codex. I have shown, in a previous note, the incompatability which resulted in the presence of sodium borate and the chlorhydrate of cocaine in aqueous solution as an eye-wash and the advantage that there was in replacing the sodium borate by the boro-borate in order that a notable quantity of cocaine can be maintained in solution. But a very small quantity of cocaine can be, nevertheless, held in solution in the presence of sodium borate. It is not the same with stovaine. This substance is extremely sensitive to the feeble alkalies. If, indeed, there is put into a tube 1 to 12 cc of a solution of stovaine, 1 part in 1000 parts of water and there is added 1 or 2 drops of lime water, there is seen at once the precipitation of dimethyamino-dimethylethylbenzoylcarbinol. The importance of this reaction from a practical standpoint resides in the fact that the glass employed for the ampoules of stovaine should be absolutely neutral.

DETECTION OF FORMIC ACID IN ACETIC ACID.*

By M. POLINSKI.

WINNIPEG, CANADA.

On the basis of formic acid being easily oxidized by boiling with sulphuric-chromic acid, which does not attack acetic acid.

Twenty c. c. of the acid under examination, which should preferably contain not more than 6 to 8 per cent. of absolute acid, is mixed with 20 c. c. of concentrated sulphuric acid and 2 to 3

**Bulletin Sociétie de Pharmacie de Bordeaux,* 1920-3, 183. Translated by V. O. Homerberg.

* From *The Chemist-Analyst,* April 1, 1920.

c. c. of a 50 per cent. chromic acid solution. If formic acid is present, a strong evolution of carbon dioxide takes place and green chromic sulphate is formed. Strong acids for examination should first be diluted with water in order to prevent propionic acid or other impurities present in the acid from reducing the chromic acid.

NEWS ITEMS AND PERSONAL NOTES

ANNUAL MEETING OF THE AMERICAN DRUG MANUFACTURERS' ASSOCIATION.—The tenth annual meeting of the American Drug Manufacturers' Association will be held at the Hotel Biltmore, New York City, April 11th-14th. The programme announces the meeting of the Scientific Section at 10 A. M., Monday, April 11th. Three sessions of this section have been arranged. The Biological Section will hold a single session at 2 P. M. on April 11th. The meeting of the entire association will open at 2 P. M., April 12th, and sessions will be held on the 13th and 14th, and the convention will close with a banquet on the evening of the latter date.

The topics announced for discussion show that the present economic problems of the country are to receive special consideration. The question of a sales tax is to be debated, pro and con, by prominent speakers, followed by discussion by the members from the floor. The meeting bids fair to become one of the epoch-making events of the year.

DECEASE OF GEORGE LINN VANDER VEER.—With sincere sorrow we record the decease of Mr. George Linn Vander Veer, advertising manager of the Norwich Pharmacal Company, which occurred on Friday, February 4th, at the Norwich Memorial Hospital.

Mr. Vander Veer was born in 1878 at Springfield Center, Otsego County, New York. After completing his school education he engaged as a clerk and learned the art of selling merchandise by actual experience behind the counter. Subsequently he became advertising manager for Polk & Calder Drug Company at Troy, New York. When this firm was absorbed by the Walker & Gibson Drug Company his services were secured by the Norwich Manufacturing Company, in whose behalf, as advertising manager, he has

worked zealously. About two weeks prior to his decease he was stricken with a general breakdown resulting from overwork. When pneumonia developed and his condition became serious, he was taken to the Norwich Memorial Hospital, and despite the application of the most modern medical treatment he passed away, the end coming suddenly.

The officials of the Norwich Pharmacal Company and his co-workers pay high tribute to his untiring and unselfish labors and his pleasing personality and broad knowledge.

He was not unmindful of the responsibilities of a progressive citizen and took an active interest in matters of civic welfare. He was an active member of the Episcopal Church and in the Masonic fraternity had risen to the 32d degree.

DR. HERTY DEMANDS GERMANY'S CHEMICAL DISARMAMENT.—In an address delivered at the invitation of the National Research Council at the opening of the exhibit of the Chemical Warfare Service in the National Museum on February 21st, Dr. Charles H. Herty strongly advocated that in order to insure the peace of the world Germany should be disarmed of her supremacy in the chemical industries. He regards the dye-stuff plants of Germany as a menace to the peace of the world. He stated that their production last month of 12,000 tons of dyes was 750 tons more than the average pre-war monthly output. From these dye plants came all of the poison gases used by the German armies during the World War. He points out the danger that might result from a union of the Bolshevist Russian army of 1,500,000 men and this chemical industry, the two most powerful agencies of destruction now extant. He argued forcibly in favor of appropriations for the army and navy to continue the study of gas warfare.

COMPETITIVE ESSAYS ON SALESMANSHIP.—In their advertisement, Colgate & Company offers a series of prizes totaling $1500 for the best essays submitted by merchants or their salesmen on the method of displaying and selling talc. This is but another indication of the value of the training in salesmanship and evidences that it is properly made a part of the curriculum in the commercial courses in colleges of pharmacy.

It is noteworthy that while these prizes are to be awarded on

the basis of merit of competitive essays submitted by all classes of merchants, two of the judges named are Samuel C. Henry, Secretary of the National Association of Retail Druggists, and Jerry McQuade, Editor of *Drug Topics,* from which we surmise that the advertiser expects that the major portion of these essays will come from the retail drug trade.

IMPORTATION OF ICHTHYOL NOT PROHIBITED.—A short time ago there appeared in the form of an advertising bulletin, issued by a chemical corporation, a statement to the effect that no more licenses would be granted for the importation of Ichthyol into the United States on the ground that recent investigations had disclosed that there was a similar commodity obtainable from domestic sources. In the newspapers this statement was repeated in a manner to indicate that it was a decision emanating from the War Trade Board. We are advised that this statement was misleading, and at the request of the War Trade Board a further bulletin has been issued for the purpose of correcting the false impression created by the publication of the bulletin referred to. Further, that by a decision of the Federal Trade Commission the petition of the Meadows Oil and Chemical Corporation for permission to use the name "Ichthyol" for its product was denied on the grounds that it was not in the public interest to grant such a license.

BOOK REVIEWS

"THE CHEMISTRY AND ANALYSIS OF DRUGS AND MEDICINES." By HENRY C. FULLER, B. Sc., in charge of the Division of Drug and Food Products, The Institute of Industrial Research, Washington, D. C. John Wiley & Sons, Inc., New York, 1072 pages. Price $10.

In 1912, Mr. Fuller issued his first book, which was entitled "Qualitative Analysis of Medicinal Preparations." This little book of about one hundred pages has expanded in the present work to a volume of tenfold size, which is distinctive in its scope, and which will find a place in every laboratory where pharmaceutical analysis is practiced.

Its scope is comprehensive and ambitious. The accuracy and completeness of its data, up to the time of the final delivery of the manuscript to the printer, which must have been some time during 1918, are commendable.

It is divided into five general sections or parts. The first of these concerns itself with the general methods of procedure and crude drug assays. Part two covers alkaloidal drugs, alkaloids and medicinally allied substances. Part three includes glucosides, glucosidal drugs and natural drugs containing other principles than alkaloids. Part four treats of organic substances other than alkaloids and glucosides. Part five covers inorganic substances commonly found in medicines.

Under each of these headings will be found a wealth of material of interest and value to the analyst who is confronted with the problem of separating and identifying, or of quantitatively determining the substances used in medicinal preparations.

The book covers a range that no other work in the English language covers at present, and it will undoubtedly find a welcome place in reference as well as in working libraries.

There are two features of the book which could be materially improved, and it is hoped that the author will not overlook these suggestions in the future editions which are bound to appear. The first of these is in the General Methods of part 1. Here should be included much additional information concerning the analysis of such preparations as are submitted in practice. How to effect the separation of emulsions with methods for identifying the emulsifying agents or reference to the proper portion of the book for the details. How to handle ointments, plasters, mixtures and many other classes of medicinal preparations which present distinctive and difficult preliminary problems before the final separation and identification of the important constituents becomes possible. For many valuable suggestions along this line the author could have availed himself of some of the publications of the Council on Pharmacy and Chemistry of the A. Ph. A., particularly the laboratory reports, which are replete with interesting data of this kind.

The other discouraging feature is the index, which is glaringly incomplete, many substances being mentioned in the text which are not found in the index at all, some of which are of importance.

A good index to a book saves time and temper and makes the user overlook deficiencies in other respects; a poor index, however,

is a perpetual annoyance. Redundancy in this section of a book rather than paucity should be the aim, yet few but German authors know how to correctly index a book.

There are few omissions that have been noticed. Among these are the constituents of hair dye preparations, paraphenyline, diamine, henna, etc., which seem to have been given absent treatment, perhaps on the technical ground that they are not medicinal preparations in the strict sense. They, however, belong in a book of this kind naturally, and their omission will be felt by the users. The chapter on glucosidal drugs is especially to be commended for its completeness and thoroughness, although this is not intended to disparage the other sections of the book. The author is to be commended for the ambitiousness of his attempt for such books exemplify the progress of American pharmaceutical chemistry and aid in its elevation.

C. H. LaWall.

"Introduction to General Chemistry." An Exposition of the Principles of Modern Chemistry. By H. Copaux; translated by Henry Leffman, A. M., M. D. P. Blakiston's Sons & Co., Philadelphia, publishers. Price, $2.00.

This is a splendid little text book, dealing, as the sub-title indicates, with the principles of modern chemistry. It is not an introduction to general chemistry in the sense of being a book for beginners. Indeed, it is intended rather for students and for practical chemists who have mastered the elements of the science, are fairly well conversant with its nomenclature, also with its most significant facts, and are interested in viewing these facts in the light of modern theories. The book is limited in size and scope, and deals only with the basic principles, which no doubt accounts for the modest title which the author has chosen. The fundamental theories which have served as a working basis for chemists for decades are stated, discussed, and supported with laboratory evidence. But articulated with these older formulations, we find the newer hypotheses and generalizations of the science, a clear understanding of which is so necessary to the intelligent reading and appreciation of the literature of present-day chemical research.

The general style of the book is didactic rather than controversial. The opening chapter deals briefly with the conception of the

element. Then follow the laws of chemical proportions—the law of Proust, of Gay-Lussac, and of Dalton. A chapter is devoted to the atomic theory, and another to the general characters and interrelations of the elements—this including some of the more recent contributions to chemical theory, particularly along those lines which in American chemical literature are grouped under the general caption *subatomic phenomena.* Next follow the theories of solutions, a most interesting presentation, involving a discussion of dissociation, or hydrolysis, of hydrates in solutions and of solid solutions; also a rather extensive discussion of chemical affinity, touching upon speed of reactions, the law of mass action, the phase-rule, catalysis—to mention but a few of the subjects of vital interest which make up this important chapter. Then follows a brief appendix, dealing with crystal structure. And finally, there is a contribution by the translator on the subject of Hydrogen-ion Concentration, a development of the theory of ionization which has in recent years been applied in practical analysis and has made possible some very delicate quantitative work, particularly in biochemistry.

In a book of limited size one cannot expect comprehensive treatment of all chemical theories; but the selection of material—as viewed from the standpoint of American needs—is in the main a happy one. We miss, however, the generalizations pertaining to the colloidal state of matter, a subject of great interest and of practical importance. To be sure, our knowledge of colloids is in the main physical knowledge rather than chemical knowledge. But the same may be said also of much else dealt with in connection with chemical theories.

The phraseology of Dr. Leffman's translation is precise and lucid. His long experience as a teacher, and as a lecturer on chemical subjects, not only to academic classes, but also to mixed audiences, stands him in good stead in presenting the subject matter clearly. This is done, however, without any effort to avoid the technical terms of science. The principles of chemistry, it must be admitted, are inherently difficult of transmission from mind to mind; the process is not made easier, however, when it is attempted to clothe chemical abstractions in colloquial English—an attempt which usually fails, except in dealing with the simpler theories. In short, the translation is admirable in that a French text book has been rendered not in what is commonly called the King's English or the Queen's, nor in that of the kindergarten, but in English far better

adapted for the purpose, namely, the clear-cut, unambiguous English of the scientist.

It should be remembered that the book is designed to meet the needs of advanced students. And to such it may be recommended unreservedly.

J. W. STURMER.

"PRIESTLY IN AMERICA, 1794-1804." By EDGAR F. SMITH. Publishers, P. Blakiston's Sons & Company, 1201 Walnut Street, Philadelphia, Pa.

In this sketch, covering the later period in the life of Joseph Priestly, Dr. Edgar F. Smith has woven a narrative in the interesting style that is so characteristic of this author's facile pen. In it, we get a glimpse of the real nature of the man; the humane side. The characteristics that made up his peculiar individuality are presented in a view that we have not obtained from other sketches of the life of this philosopher and chemist.

The personal touch given by the author gives us an insight into the kindly character, his philosophy, and even the false judgment and tenacious adherence to some erratic views that led him to fallacious deductions even from his own experiments. His championing of the Phlogiston theory caused him to bend his views toward explanations based thereon to the exclusion of some more obvious and scientific conclusions that have since been adopted.

Priestly appears to have been a past master in the art of controversy. His dissenting theological views and his earnestness in arguing thereon made him so unpopular in England that he became the victim of mob violence, and this was the reason for his exile to America. His friendship with Franklin probably determined his emigration.

Dr. Smith's sketch shows that, even after his arrival in America, his life was not free from this disposition to controversy. His views called forth remorseless attack from William Cobbett (Peter Porcupine), whose abusive and sarcastic productions were a feature of the literature of that decade.

The events associated with Priestly's landing in New York and the various addresses of welcome show that he was given quite an ovation upon his arrival in the new country.

In the fall of 1794, Priestly took up his residence in North-

umberland, Pa. The close proximity of his residence to Philadelphia permitted him to make occasional visits to the city and to associate with the scientific men of Philadelphia of that period, and form many lasting friendships with these. His several contributions to the American Philosophical Society are referred to, and the events in his personal history are feelingly described.

In perusing the pages of this book, one is convinced that Joseph Priestly played an important part, during his sojourn in America in the last ten years of his life, by his discussions not only on chemical subjects but on political, theological and educational matters, and withal science, as he understood it, was interwoven.

In this publication, the author has added another service to the many that he has rendered in behalf of chemical sciences, by reciting reminiscences of the later days, and giving us a clear view of the events associated with the career and life of Joseph Priestly. The epitaph on his tomb stone in the Northumberland burial ground is peculiarly appropriate to the character of one whom we must consider as a foremost philosopher of his day.

"Return unto thy rest, O my soul, for the
Lord hath dealt bountifully with thee.
I will lay me down in peace and sleep till
I wake in the morning of the resurrection."

G. M. B.

"A Critical Revision of the Genus Eucalyptus." By J. H. Maiden, I. S. O., F. R. S., F. L. S. Vol. V. No. 3.

Part XLIII of this complete work, now in hand, continues this classical study of this genus of plants so important to Australia from both a botanical and economical viewpoint. The uniform plan of treatment of the subjects, adopted in the preceding parts of this work, are continued in the present section. In this the following species are considered: *Eucalyptus ficifolia* F. v. M.; *E. calophylla* R. Br.; *E. hæmatoxylon* Maiden; *E. maculata* Hook; *E. Mooreana* (W. V. Fitzgerald) Maiden; *E. approximans* Maiden, and *E. Stowardi* Maiden.

The four plates in this part maintain fully the high artistic illustrations that are characteristic of this monographic study.

G. M. B.